
# Adoption and Use of Generalized Audit Software by Indonesian Audit Firms

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Rindang Widuri

B. Comp. Studies

Master of Management

School of Accounting

College of Business

RMIT University

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## DECLARATION

I certify that except where due acknowledgement has been made, the work is that of the author alone, the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethic procedures and guidelines have been followed.

**Rindang Widuri**

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## ABSTRACT

This study investigates the adoption and use of Generalized Audit Software (GAS) by Indonesian audit firms. GAS is specialized software that enables the auditor to automate tasks including client risk assessment. The researcher believed GAS use in Indonesia is not widespread and one explanation for this is the absence of professionally qualified accountants (ADB, 2003) and the World Bank (2011) reported that audit practices in Indonesia face a quality related problem especially in mid-tier and small-sized firms. Audit firms began using IT, including GAS (Braun and Davis, 2003, Coderre, 1996, Debreceny et al., 2005, Lovata, 1990, Junaid, 2005, Alles et al., 2002), during the 1980s to improve effectiveness and efficiency (Fischer, 1996). However, previous studies (Janvrin et al., 2008b, Debreceny et al., 2005) indicate that external auditors used applications infrequently and instead, were likely to depend on unsophisticated analytical review procedures (Fischer, 1996). Traditional analytical review procedures, such as ratio analysis, have limited ability to detect fraud (Hogan et al., 2008) and without rigorous processes, many professionals believe that stakeholders are not adequately informed and therefore the quality of auditing is questionable. Most studies into audit technology or audit software have focused on the largest firms in developed economies (Bedard et al., 2003, Curtis and Payne, 2008, Vendrzyk and Bagranoff, 2003). Studies in developed economies indicate that audit software has been adopted extensively by Big four firms (Janvrin et al., 2008a).

The results of this study are based on semi-structured in-depth interviews with 27 external auditors from firms of all sizes, a senior member of a professional body, and 6 staff from 2

Government agencies. The interviewees were selected using the snowballing method. The interviews were in-depth, semi-structured and included open-ended questions to elicit views and opinions from participants related to adoption and use of GAS. In addition, archival records and secondary sources were also reviewed to interpret the findings. This study contributes to the literature through its Indonesian focus, deeper insights through use of interview rather than survey data, knowledge of large and small audit firms, and the application of a new theoretical framework to the audit literature, the Technology, Organisation and Environment (TOE) framework.

Major findings imply that the use of commercially available software remains limited across audit procedures. The TOE framework indicates that the influence of technological, organisational and environmental factors on GAS adoption is spread equally however the findings of this study identify environmental influences as the most important in the Indonesian context. Client related factors such as size, industry sector, needs and expectations and regulator's and the professional accountancy body's supports mainly dictated GAS adoption. There was mixed perception between participants regarding the competitiveness of a firm, assured audit quality and working uniformity as benefits of GAS use. However, all participants agreed that improved efficiency and increased audit productivity can be achieved from GAS use.

## LIST OF TERM AND ABBREVIATIONS

| | | |
|---|---|---|
| ACL | : | Audit Command Language |
| ADB | : | Asian Development Bank |
| AEC | : | ASEAN Economic Community |
| AICPA | : | American Institute of Certified Public Accountant |
| ASEAN | : | Association of Southeast Asian Nations |
| BI | : | Bank of Indonesia |
| CAATs | : | Computer Assisted Audit Techniques |
| CBD | : | Central Business District |
| CPA | : | Certified Public Accountant |
| CPD | : | Continuing Professional Development |
| DoI | : | Diffusion of Innovation |
| DSAK | : | Indonesia Financial Accounting Standards Board |
| DSP | : | Audit Standards Committee |
| e-CRM | : | Electronic Customer Relationship Management |
| EDI | : | Electronic Data Interchange |
| ERP | : | Enterprise Resource Planning |
| GAAP | : | Generally Accepted Accounting Principles |
| GAAS | : | Generally Accepted Auditing Standards |
| GAS | : | Generalized Audit Software |
| GDP | : | Gross Domestic Product |
| IAI | : | Indonesian Institute of Accountants |
| IAO | : | Indonesian Audit Organisation |
| IAPI | : | Indonesian Institute of Certified Public Accountant |

| | | |
|---|---|---|
| IAS | : | International Accounting Standards |
| ICT | : | Information, Communication and Technology |
| IDEA | : | Interactive Data Extraction and Analysis |
| IDX | : | Indonesian Stock Exchange |
| IFAC | : | International Federation of Accountants |
| IFRS | : | International Financial Reporting Standards |
| IS | : | Information System |
| ISA | : | International Standards on Auditing |
| IT | : | Information Technology |
| ITF | : | Integrated Test Facility |
| NIVA | : | Nederlands Institute van Accountants |
| OJK | : | Financial Services Authority |
| PAI | : | Indonesian Accounting Principles |
| PPAJP | : | Center for Supervision of Accountants and Appraiser Services |
| PPAk | : | Professional Education for Accounting |
| PSAK | : | Indonesian Financial Accounting Standards |
| ROSC | | Report on the Observance of Standards and Codes |
| SAK 1994 | : | Indonesian Financial Accounting Standards 1994 |
| SAK-ETAP | : | Financial Accounting Standards for Non-Publicly Accountable Entities |
| SAS | : | Statement of Auditing Standards |
| SME | : | Small to Medium Enterprise |
| SOE | : | State Owned Enterprise |
| SPAP | : | Indonesian Public Accountant Professional Standards |
| SQL | : | Structured Query Language |
| TAM | : | Technology Acceptance Model |

| | | |
|---|---|---|
| TOE | : | Technology, Organisation and Environment |
| TPB | : | Theory of Planned Behaviour |
| TRA | : | Theory of Reasoned Action |
| UTAUT | : | Unified Theory of Acceptance and Use of Technology |

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# CHAPTER 1 - INTRODUCTION

## 1.1 Introduction

This study investigates the adoption and use of Generalized Audit Software (GAS) by Indonesian audit firms. GAS is specialized software that enables the auditor to automate tasks including client risk assessment. The results of this study are based on semi-structured in-depth interviews with external auditors from firms of all sizes, a senior member of a professional body, and Government agencies. This study contributes to the literature through its Indonesian focus, deeper insights through use of interview rather than survey data, knowledge of large and small audit firms, and the application of a new theoretical framework to the audit literature, the Technology, Organisation and Environment (TOE) framework. Major findings include the use of commercially available software remains limited across audit procedures and audit firms, especially small to medium size firms. Specifically, client related factors such as size, industry sector, needs and expectations mainly dictated GAS adoption. In terms of the TOE framework, results of this study identify environmental influences as the most important influences on adoption in the Indonesian context whereas as this framework suggests the influence of technological, organisational and environmental factors on GAS adoption should be spread equally (Tornatzky & Fleischer 1990). The implications of GAS for the quality of the audit process are also discussed in this study.

The impact of information technology (IT) and computer assisted audit techniques (CAATs) on audit methodology changes the way companies interact with customers and

the reporting and publishing of financial information (Rezaee et al., 2001). Since the use of computerized systems, the frequency of electronically completed audits has increased and the traditional paper trail is disappearing from the workplace (Braun and Davis, 2003, Devaraj and Kohli, 2003). The increase in electronic evidence requires auditors to use appropriate techniques to manage computerized internal control systems. Now, auditors need to test systems for accuracy, reliability and assess risk by using CAATs and generalized audit software (GAS).

Braun and Davis (2003) defined CAATs as "any use of technology to assist in the completion of an audit". Its use includes word processing and electronic spreadsheets and expert systems (Debreceny et al., 2005, Ismail and Abidin, 2009). Previous researchers have documented the type of CAATs (see for example: Lovata, 1990; Braun and Davis, 2003; Ismail and Abidin, 2009; Greenstein-Prosch, McKee and Quick (2008) and Ching-Wen and Wang, 2011) including GAS, the most frequently used form of CAATs by auditors. GAS is a class of CAATs enabling auditor to extract data, query, manipulate, summarize and analyse tasks (Boritz, 2002, Debreceny et al., 2005, Ahmi and Kent, 2013). In previous studies, GAS has been represented by commercially available software, *ACL*[1] and/or *IDEA*[2] however larger audit firms have developed their own application internally (Bierstaker et al., 2001). A more detailed description of *ACL* and *IDEA* can be found in Ching-Wen and Wang (2011). This study focuses on the adoption and usage of GAS and Figure 1.1 describes CAATs and GAS as understood from previous research.

[1] Audit Command Language (http://www.acl.com)
[2] Interactive Data Extraction and Analysis (http://www.caseware.com/products/idea)

Kinney Jr's (1986) definition of "best audit practice" includes the use of technology implemented during the audit process. Winograd et al. (2000) described PricewaterhouseCoopers (PwC) use of technology as a critical part in the delivery of client services ensuring best practice is applied to the entire audit process. Kinney Jr (1986) stated that adoption of audit technology improves audit quality and this is spelt out in US auditing standards. For example, to identify risk and fraud, the US Statement of Auditing Standards (SAS) No 316.52 state the auditor needs "to employ computer assisted audit techniques to gather more extensive evidence about data contained in significant accounts or electronic transaction files" (AICPA, 2006). Moreover, SAS No 316.61 recommends the auditor use CAATs when conducting an audit in an IT environment. However, the codification of technology adoption with regard to auditing standards may not always motivate firms to adjust their technology.

The changes in audit practices that use IT have not kept pace with technological development in large companies (Brooks & Lanza 2006; Janvrin, Bierstaker & Lowe 2008). Audit firms began using IT, including GAS (Braun and Davis, 2003, Coderre, 1996, Debreceny et al., 2005, Lovata, 1990, Junaid, 2005, Alles et al., 2002), during the 1980s to improve effectiveness and efficiency (Fischer, 1996). However, previous studies (Debreceny et al. 2005; Janvrin, Bierstaker & Lowe 2008) indicate that external auditors used applications infrequently and instead, were likely to depend on unsophisticated analytical review procedures (Fischer, 1996). Traditional analytical review procedures, such as ratio analysis, have limited ability to detect fraud (Hogan et al., 2008) and

without rigorous processes, many professionals believe that stakeholders are not adequately informed and therefore the quality of auditing is questionable.

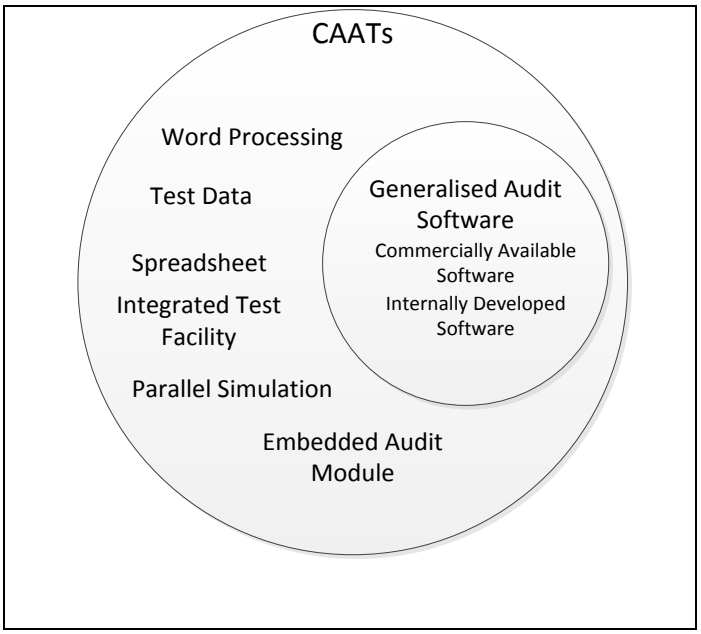


**Figure 1.1 - Description of CAATs**

## 1.2 Motivation

Indonesia, as a developing economy, is an evolving business environment through which to study the use of GAS. The purpose of this research is predicated on the fact GAS use is recent to Indonesian audit practices and therefore it is important to gain a comprehensive understanding of its implementation. Moreover, as a developing economy with a distinct culture and operating environment, Indonesia provides an appropriate setting through which to compare the implementation of GAS in an audit context with western-focused studies. From within the perspective of the Indonesian audit profession, companies with a high level of concentrated ownership are more likely to consult a Big four firm. Family-controlled firms are less likely to be audited by a Big four firm that may imply an opaqueness of their business details (Darmadi, 2012). The focus of this study will be on

identifying and examining factors that explain an audit firm's adoption and use of GAS from the perspective of a developing economy. As noted above, findings are based on interviews conducted with external auditors.

The researcher chose to study GAS in Indonesia due to her knowledge of the context. She believed GAS use in Indonesia was not widespread and it would be useful to explore the reasons. One explanation for this might be the absence of professionally qualified accountants (ADB, 2003). Moreover about 40 percent of public accountants are aged over sixty and 8 percent are aged under forty (WorldBank, 2011). Older accountants may be reluctant to use new technology in comparison to their younger peers. In 2014, the Center for Supervision of Accountants and Appraiser Services (PPAJP), estimated there were 383 audit firms in Indonesia including all of the Big four, mid-tier and small-sized firms. *Indonesian Company Law No. 40 (2007)* requires all public companies, non-bank financial institutions, and banks is audited by a certified public accountant (CPA). To be eligible to conduct an audit in a capital market environment, a CPA must be registered as an auditor with the Financial Services Authority (OJK). For eligibility as a banking industry auditor a CPA must be registered with Bank of Indonesia (BI). OJK and BI monitor the competency, consistency and compliance of auditors regarding capital markets and bank audit requirements.

The World Bank (2011) reported that audit practices in Indonesia face a quality related problem especially in mid-tier and small-sized firms. Many auditors do not design a

proper audit plan to address identified risks. Some auditors do not have effective audit documentation procedures or a clear understanding of how and which documents should be kept securely. Given these conditions, it is challenging to provide an accurate audit opinion. In terms of fraud detection and the collection of evidence for "going concern" assumptions, it has been reported auditors tend to use unsophisticated procedures. Auditors do not maintain a professional scepticism towards data provided by clients and have a high reliance on management assumptions regarding a client's financial circumstances. As a result of these audit quality concerns, it is not surprising that investors in Indonesia are more likely to trust financial accounts audited by the Big four. These audit quality issues are of concern given the prevalence of Non-Big four firms in Indonesia and could result in adverse consequences for investors. Furthermore, the World Bank (2011) recommends professional accounting bodies need to provide more effective assistance to small and mid-tiered firms for the purpose of improving audit practices. The World Bank (2011) also highlighted small and mid-tiered firms that perform banking industry audits, especially rural banks, have limited capacity to provide high-quality services due to the lack of qualified staff and technology.

### 1.3 Research Objectives and Research Questions

As previously emphasized, GAS use is recent to Indonesian audit practices and therefore it is important to gain a comprehensive understanding of its implementation. Moreover, there is a need for more detailed information from Indonesian audit firms that have implemented GAS as there is a lack of substantive research about its adoption and use. It

follows that the main objective of this research is to examine external auditors' adoption and use of GAS in Indonesia. The specific research objectives are:

1. To investigate the current use of GAS and the context of Indonesian auditing practices.
2. To understand the benefits of GAS use by Indonesian external auditors.
3. To examine the adoption and use factors of GAS by Indonesian external auditors through use of Technology, Organisation and Environment (TOE) framework.
4. To identify the barriers to GAS adoption and use through the use of the Technology, Organisation and Environment (TOE) framework.

To achieve the above objectives, the following research questions were developed.

1. What form of GAS is used by Indonesian audit firms and the context of its use?
2. To what extent do Indonesian external auditors believe GAS use provides benefits that improve the quality of an audit process?
3. What factors lead to increased adoption of GAS in Indonesia?
4. To what extent does the literature on the TOE framework provide insights into GAS adoption in Indonesia?
5. What are the factors hindering the adoption and usage of GAS in Indonesia?

### 1.4 Research Scope

As this study examines the adoption and use of GAS in Indonesian auditing practices, the study's participants were mainly drawn from external auditors across the Big four, mid-

tier and small-sized firms. To determine the size of firms, the researcher asked participants to describe the firms for which they worked in terms of the number of partners and auditors and whether the firm was internationally affiliated. The results of this process were consistent for example, the firm was considered as small where the number of partners was less than 5, with 10-20 auditors and not internationally affiliated. The rest were considered as mid-tier unless they were one of the Big four.

The study sorts to obtain accurate information about the management and technical perspectives of GAS adoption and use. Accordingly, participating external auditors were partners, audit managers, senior and junior auditors who represented different skills, experience and qualifications. For example, a partner or audit manager was interviewed for the managerial perspective and senior and junior auditors were interviewed for their technical information about GAS use. This interview structure enabled researcher to interview more than one person from the same firm.

To provide a broad perspective from stakeholders, participants from Government agencies and a professional accountancy body were also interviewed. This study endeavoured to provide a balanced analysis by including comments from these groups in addition to the auditors themselves.

This study uses a definition of GAS as described in Figure 1.1. It is important to establish a definition that enables the researcher to identify which audit firms use GAS as well as the extent of use. It should be noted that where GAS was not used, the interviewee would still be included in the study as their opinion regarding GAS adoption and use, benefits, hindrance would still add to the study.

## 1.5 Research Contributions

This study contributes to theory and practice in several ways. First, it provides insights into GAS adoption and use in the external audit setting in disparate sized firms in a developing economy. Previous studies have focused on developed economies. To date, comprehensive research about this issue has been lacking hence this research contributes and increases the knowledge base. Most studies into audit technology or audit software have focused on the largest firms in developed economies (Bedard et al., 2003, Curtis and Payne, 2008, Vendrzyk and Bagranoff, 2003). Studies in developed economies indicate that audit software has been adopted extensively by Big four firms (Janvrin, Bierstaker and Lowe 2008) .

Second, this study introduces the Technology, Organisation and Environment (TOE) Framework as part of the GAS adoption process in an external audit firm context in Indonesia. Previous studies such as Bedard et al. (2003), Curtis and Payne (2008) and Janvrin et al. (2008c) focused on large or international audit firms and used the Unified Theory of Acceptance and Use of Technology (UTAUT) or the Technology Acceptance

Model (TAM) as their theoretical basis. UTAUT and TAM have been used to identify individual acceptance of new information systems (IS). By using the TOE framework, the researchers have gained insights into technological, environmental, organisational and individual IT adoption factors. The focus of other research such as that of Bedard et al. (2003), Curtis and Payne (2008), Janvrin et al. (2008c), Dowling (2009) and Kim et al. (2009) has been restricted to individual adoption factors.

Another contribution this study makes is from its fieldwork approach. The researcher elicited information and analysed data collected from interviews with external auditors regarding their use of computerized audit tools. Studies such as Braun and Davis (2003), O'Donnell and Schultz Jr (2003a), Dowling (2009) and Ahmi and Kent (2013) relied on a survey-based approach that was unable to elicit the same depth of understanding about the subject. Interview-based studies in this area were conducted by Debreceny et al. (2005) and Dowling and Leech (2007) but are limited due to small number of participants and only focused on a specific industry, such as banking or on Big four firms only. Moreover, they focused on audit firms or clients but did not include other stakeholders such as Government agencies and the professional accountancy bodies.

## 1.6 Overview of Research Methods

This study uses a qualitative research approach that enables researchers to investigate a particular subject in-depth. It is also suited to exploratory research, where the particular topic is relatively new and there is an absence of previously published research (Myers,

2009). This study is exploratory in nature because other CAATs or GAS studies have not focused on a developing economy such as Indonesia. The decision to use a different theoretical framework to previous studies and the inclusion of research participants from Indonesian audit firms of all sizes motivated the researcher to use a qualitative approach. The use of a qualitative research approach enabled the researcher to use a combination of data collection techniques, such as in-depth interviews, archival records and other secondary data sources. This allowed the researcher to use data triangulation to maintain data validation and reliability of findings (Denzin, 1989).

Several studies in GAS use and adoption (see, for example, Ahmi and Kent, 2013; Bedard et al., 2003; Braun and Davis, 2003; Dowling, 2009; Dowing and Leech, 2007; Janvrin et al., 2008, 2009; O'Donnell and Schultz Jr, 2003), have focused on developed countries, such as the US and the UK. Moreover, these studies have tended to use survey questionnaires that do not deliver an in-depth analysis of the decision to use GAS. Previous research is lacking from the perspective of its adoption and use in Indonesian audit firms resulting in a lack of detailed understanding. The absence of research meant the researcher did not have information that may have facilitated a complex process of investigation into these issues.

As stated above, the data collection process was based on in-depth interview with 34 participants. Most of participants were external auditors selected through the snowballing method. The interview groups consisted of 27 external auditors from 18 firms, 6 regulators from PPAJP and OJK and one senior member of a professional accountancy

body, the Indonesian Institute of Certified Public Accountants (IAPI). Prior to conducting interviews, the researcher undertook a pilot study to ensure the interview guide was accurately formulated. Two junior external auditors and two academics from two reputable universities in Jakarta were invited to participate in the pilot test. Some minor changes were made to the interview instrument on the basis of this pilot testing. These changes are detailed in the Method Chapter of the thesis.

The interviews were in-depth, semi-structured and included open-ended questions to elicit views and opinions from participants related to adoption and use of GAS. The interviews were held in the participants' office and audio recorded with the interviewees' permission. The interviews were conducted in 2 stages. The first stage was held to interview external auditors and a member of IAPI. The second stage was conducted to validate and clarify responses and to interview staff from PPAJP and OJK. Staff from these organisations needed to be included in this process because findings from the first stage interview identified diverse opinions regarding the role of regulators in encouraging GAS adoption and use.

This study uses data triangulation (Denzin, 1989), member checking and disconfirming evidence (Creswell and Miller, 2000, Yardley, 2007) to maintain research validity and reliability. Data triangulation was achieved by cross-comparing interview data from each group of participants, namely, auditors, the relevant Government agencies (OJK and PPAJP) together with the professional accountancy body (IAPI). Interview data was also validated where possible by comparison with relevant archival records, such as

International Standards on Auditing, Indonesian Public Accountant Professional Standards (SPAP), the *Public Accountant Act Number 5 of 2011* and *Indonesian Company Law number 40 of 2007*. Secondary sources such as scholarly and practitioner journal articles, IAPI's website (www.iapi.or.id), the PPAJP's website (www.ppajp.depkeu.go.id), auditing textbooks, Asian Development Bank (ADB) report 2003 and the Report on the Observance of Standards and Codes (ROSC) published by the World Bank in 2005 and 2011 were also used to validate the interview data and to develop and support the arguments raised in this study. Member checking was conducted by sending the interview transcripts to each participant to ensure their comments were understood accurately by the researcher. Most participants agreed with the content and interpretation of transcriptions, few made additional comments. The researcher included additional comments in the final transcriptions. Disconfirming evidence was acquired through contrasting opinions or perspectives between participants. This process was necessary because some participants particularly external auditors, were from different sized firms and the researcher perceived it as important to acknowledge diversity of opinion.

## 1.7 Organisation of the Thesis

This study is structured in six chapters. It consists of introduction, literature review, theoretical framework, Indonesian context, research method, findings, and conclusion.

Chapter 1 provides an introduction to the background of the study. The chapter describes details of the research, including objectives, questions, scope, methods and a brief description of each chapter. It also describes the study's contribution to the existing body of knowledge about the subject.

Chapter 2 contains the review of relevant literature regarding the adoption and use of GAS by internal or external auditors. It describes the impact of IT on the audit process including the introduction of CAATs and GAS. Studies in the adoption and use of CAATs or GAS and its impact on an audit firm's competitive advantage are also discussed in this chapter. The theoretical framework of the present study is discussed through including organisational theories of IT acceptance and adoption. The theories are the TOE framework and Diffusion of Innovation theory (DoI), UTAUT and TAM. Justification for the use of TOE framework in the present study is also set out in the chapter's conclusion.

Chapter 3 describes the Indonesian political, social, and economic climate as well as the information, communication and technological (ICT) context. It also describes the establishment, development and role of public accountancy and auditing in the country. The history of regulations and underpinning law from post-independence to period of reform (1998-current) is also described. This chapter provides information about the convergence process of both the Indonesian Financial Accounting Standards (PSAK) to International Financial Reporting Standards (IFRS) and the Indonesian Public Accountant

Professional Standards (SPAP) to International Standards on Auditing (ISA). This chapter also reports the challenges faced by local public accountants in the ASEAN Economic Community (AEC) in 2015.

Chapter 4 describes the research assumptions that underpin the study, justification for sample selection and the criteria for participants and method of access. The development of the research instrument and the process of its translation from English to Bahasa (Indonesian national language) are included. This chapter demonstrates the validity of the study through describing research process that includes pilot testing and interviews, data coding and analysis.

Chapter 5 describes the findings and presents the discussion consistent with the research questions described in this chapter. The first section describes the context and use of GAS by audit firms in Indonesia and answers the first research question. Audit firms categorised by size are included and the benefits of GAS are explained and those most prevalent are identified. The next section of this chapter discusses the adoption and use factors of GAS from the perspective of the Technology, Organisation and Environment (TOE) Framework. This section explains insights from the TOE framework into the adoption of GAS with specific reference to the Indonesian context. A discussion about factors hindering GAS adoption and use in Indonesia follows and are linked to the TOE framework.

Chapter 6 contains the conclusion of the thesis and summary of the interview findings. The chapter concludes with a description of the research implications, limitations and suggestions for future research.

# CHAPTER 2 - LITERATURE REVIEW AND THEORETICAL FRAMEWORK

## 2.1 Introduction

This chapter includes studies of audit-related IT implementation that focuses on the external auditing context. Research about the impact of IT on the audit process is presented at the beginning. The next section describes the introduction to Computer-Assisted Audit Techniques (CAATs) and Generalized Audit Software (GAS), followed by previous studies about its adoption, acceptance and use.

The theoretical framework section describes the relevant theories, models and frameworks relevant to GAS adoption, such as Technology, Organisation and Environment (TOE) framework, Diffusion of Innovation (DoI), Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Acceptance Model (TAM). This section also explains the justification of the use of TOE framework as an underpinning theory.

## 2.2 The Impact of IT on the Audit Process

The implementation of electronic data interchange (EDI) or enterprise resource planning (ERP) into companies has changed the way transactional data is kept and maintained. IT changes the way companies interact with its customers and also the method of reporting and publishing financial reports (Rezaee et al., 2001). The implication of IT use in companies was described by Messier et al. (2004) and their research found that financial misstatements are more prevalent in computerized business process. Since the use of

computerized systems, the frequency of electronically completed audits has increased and the traditional paper trail has disappeared from the workplace (Braun and Davis, 2003, Devaraj and Kohli, 2003). The increase in electronic evidence requires the auditor to use new techniques to conduct an audit. Now, auditors need to test the client's internal controls and systems for accuracy, reliability and to assess risk by using generalized audit software (GAS).

Previous studies show that IT can be employed at every stage of the audit process. Dowling and Leech (2007) studied audit support systems and decision aids used by the Big four and one other large audit firm. They defined audit support systems as one of the technologies used by firms to conduct audits. The examples they gave of audit support system were electronic working papers, accounting and auditing standards, regulations, and decision aids. They found that audit support systems could be used at each stage of the audit process. For example, an automated checklist was used for decision-making at the client acceptance and understanding stage. With an understanding the client's control environment, a questionnaire or the involvement of an IT specialist can be employed. An audit program or a list of audit steps can be used at the control and substantive testing stage. A checklist is the most frequently used decision-making aid at the review stage. Audit support systems were employed at all stages of the audit process. However, Dowling and Leech (2007) also found that not all audit support systems were computer-based. Although this study was conducted qualitatively by interviewing audit partners or managers, but it is similar to many others as only participants from the Big four and one mid-tier firm were interviewed.

There are a number of studies that focus specifically on computer-based audit support systems. For example, Bierstaker et al. (2001) documented the impact of technology on audit planning in five large audit firms and asserted that technology can be used to provide client-specific internal controls that assist the auditor identify the flaws in the client's systems. They also found that technology is useful for analysing the client's business processes, to determine and assess the level of controls and to recommend tests that need to be performed. Furthermore, technology guarantees compliance with audit standards and other audit-related regulations. Bell et al. (2002) described the use of computerized decision making for client acceptance and continuance risk assessments through a case study of the Big four firms. The computerized decision-making aid assesses the client's risks by evaluating financial-related information, relationship or independence issues and environmental factors such as industry context and regulation. Bierstaker et al. (2001) described the use of technology on the audit process by interviewing IT professionals from four of the five largest US accounting firms. Bell et al.'s (2002) and Bierstaker, Burnaby and Thibodeau's (2001) studies were descriptive in nature and focused on a singular audit application from one audit firm hence the two studies are not generalizable to the external auditor's actual use of technology.

Previous studies (for example, Braun and Davis 2003; Devaraj and Kohli 2003; Dowling and Leech 2007) found that the increased use of IT by clients effects on the audit process by encouraging firms to use sophisticated computer-based tools and motivates auditors who are not trained in computerized systems to enhance their skills and knowledge (Abu-

Musa, 2004). Furthermore, IT adoption increases productivity (see, for example, Shumate and Brooks (2001) Banker et al. (2002), Vera-Muñoz et al. (2006) and Hsihui et al. (2011)) and efficiency in audit firms (for example, Williams and Dirsmith (1988)). In summation, the previous research indicates that the impact of IT on the audit process has been significant in many ways. However, it should be recognised that previous studies have focused on large audit firms in developed economies.

## 2.3 Introduction to Computer-Assisted Audit Techniques (CAATs) and Generalized Audit Software (GAS)

Previous studies described the use of IT terminology in audit practices by terms such as *audit automation* (Manson et al., 1998, Greenstein-Prosch et al., 2008), *audit application* (Janvrin, Bierstaker and Lowe 2008) , *audit support software* (O'Donnell and Schultz, 2003a, Dowling and Leech, 2007), a *computerized decision aid* (Bell et al., 2002) and *computer-assisted audit techniques* (CAATs) (Ahmi and Kent (2013); Braun and Davis (2003); Debreceny et al. (2005); Janvrin, Lowe and Bierstaker (2008c); Shumate and Brooks (2001)). However, GAS is the most frequently used term by researchers (Ahmi and Kent, 2013, Debreceny et al., 2005, Boritz, 2002).

As is discussed in Chapter 1, Braun and Davis (2003) defined CAATs as "any use of technology to assist in the completion of an audit". Its use includes word processing and electronic spreadsheets and to expert systems (Debreceny et al., 2005, Ismail and Abidin, 2009). The use of CAATs includes the integration of several computerized programs for the completion of the audit process (Braun and Davis, 2003, Shumate and Brooks, 2001).

It includes the use of computerized audit tools to extract, analyse and document working papers generated by auditors. Braun and Davis (2003) identified five types of CAATs; data testing, integrated test facilities (ITF), parallel simulation, embedded audit modules and GAS. They described test data as the test of a client's system by processing auditor data into the system. Should the output from this process indicate variance with auditor-expected output, it could be an indication that the system has a control problem.

An integrated test facility is described by Braun and Davis (2003) as the involvement of an auditor at the system development stage of the client's system for the purpose of designing and inserting audit modules. It is expected, that once the system is implemented, the audit modules will identify any irregular data originating from fraudulent activities. Through parallel simulation, the auditor develops a system and runs it using the client's data. The purpose of parallel simulation is to increase the quality of the client's systems by comparing it with the output from an auditor-developed system. An embedded audit module involves the design of audit modules that are developed by the auditor. The audit module is inserted into the client's systems and contains criteria used to inform the auditor of any irregularities that become apparent during data processing.

The final type of CAATs according to Braun and Davis (2003) is GAS and it will be discussed in detail in the next section. In brief, GAS consists of commercially available (Ching-Wen and Wang, 2011) and internally developed software (Bierstaker et al., 2001).

Janvrin, Lowe and Bierstaker (2008c) studied external auditors across the US to identify factors that affected CAATs use, they found that comprehensive training programs affected the use of CAATs as they improved auditors' confidence in using the technology. Moreover, it was recommended that audit firm management invest in CAATs related infrastructure. It was indicated that client size and client IT infrastructure were factors that drive audit firms to use CAATs. Janvrin, Lowe and Bierstaker (2008c) claim that the audit firm's resources and individual user perceptions are important factors to the acceptance of CAATs. Janvrin, Lowe and Bierstaker (2008c) did not specify the type of CAATs they investigated. Since a broad range of respondents participated in their study, it is expected the type of CAATs used varied across respondents. However, it is important to identify which CAATs were used by respondents so that acceptance and use factors can be isolated.

Many studies do not specify the type of CAATs investigated (see for example, Manson et al. 1998; Janvrin, Lowe & Bierstaker 2008, Shumate and Brooks 2001; Asgari, Soleimanian and Goli 2013). However, Ching-Wen and Wang (2011) identified that the commonly used CAATs by audit firms are *MS Excel*, *MS Access* and GAS. Braun and Davis (2003), Debreceny et al. (2005) and Ahmi and Kent (2013) claim that GAS is the most popular and widely used CAATs.

Research has identified GAS as the most popular used form of CAATs. Braun and Davis (2003) assert that the use of GAS does not require a high level of technical knowledge of computer programming. GAS is a class of CAATs that allows auditor to extract data,

query, manipulate, summarize and analyse tasks (Boritz, 2002, Debreceny et al., 2005, Ahmi and Kent, 2013). In previous studies, GAS has consisted of commercially available software, such as *ACL*[3] and/or *IDEA*[4] however larger audit firms have developed their own GAS internally (Bierstaker et al., 2001). A more detailed description of *ACL* and *IDEA* can be found in Ching-Wen and Wang (2011).

Research about GAS use is varied and includes data from basic to advanced use. Examples of basic or general use are data extraction, querying, and sampling (Debreceny et al. 2005; Janvrin, Bierstaker & Lowe 2008). Examples of advanced or specific use are data mining (Janvrin, Bierstaker & Lowe 2008) , continuous monitoring or auditing (Ahmi & Kent 2013; Janvrin, Bierstaker & Lowe 2008) and digital analysis (Cleary & Thibodeau 2005; Janvrin, Bierstaker & Lowe 2008). Studies have examined potential factors drive GAS adoption are limited. As there is limited evidence about GAS related research, this study focuses on its adoption and usage.

## 2.4 Previous Studies about CAATs or GAS Adoption or Acceptance and Use

Since the 1980s, IT has been used in audit practices to improve effectiveness and efficiency (Fischer, 1996). Previous research demonstrates that external auditors need to adopt audit technology (DeAngelo, 1981, Sikka, 2009, Sirois and Simunic, 2010) as it improves the levels of effectiveness, efficiency and judgement Janvrin, Bierstaker & Lowe 2008) . Moreover, the auditors' use of technology enhances the quality of audit procedures (Manson et al., 1998) and audit quality (Dowling, 2009). Studies such as

[3] Audit Command Language (http://www.acl.com)
[4] Interactive Data Extraction and Analysis (http://www.caseware.com/products/idea)

Ahmi and Kent (2013), Bierstaker et al. (2001), and Brooks and Lanza (2006) indicate regulators and professional bodies in developed economies encourage the use of technology in audit practices where CAATs and GAS related research is limited. The next section will discuss CAATs and GAS research.

Brancheau and Wetherbe (1990) define the individual adoption process as "the process through which an individual passes from first knowledge of an innovation, to a decision to adopt or reject, to implementation of this decision" . In terms of the IT adoption literature, Premkumar et al. (1994) argued that IT adoption relates to the internal (i.e organisational) and external (i.e social order) characteristics that drive the entity to accept and implement a specific innovation. The terms technology acceptance and adoption have been used interchangeably in IT literature (Agarwal and Prasad, 1998a). However, in Hsu et al. (2006), Kwon and Zmud differentiated the stage of technology acceptance and adoption as can be seen in Figure 2.2.

| Unfreezing | Change | Refreezing |
|---|---|---|
| Initiation → | Adoption → Adaptation → | Acceptance → Routinization → Infusion |

**Figure 2.2 - Six-Phase View of IT Use Process (Hsu et al., 2006)**

Figure 2.2 shows that the adoption stage comes before IT is accepted. Moreover, Figure 2.2 implies that the use of IT is a consequence of the adoption and acceptance stage. Most existing IT literature has focused on the acceptance and use of IT, however, the present study has divided CAATs or GAS-related studies into two categories, which are (1)

adoption or acceptance and (2) use of GAS. The following section is organised with reference to the two categories of studies mentioned above.

Appendix 1 summarizes previous studies about the adoption, acceptance and use of CAATs and GAS and its findings. To explain the contribution of the present study toward existing studies, Figure 3 maps the position of existing studies in terms of the research approach (quantitative and qualitative), profile of respondents (internal, external and government auditor), the country context and the underpinning theory and model. Table 2.1 provides detailed information regarding each study as numbered in Figure 2.3.

Figure 2.3 shows there have been many CAATs or GAS-related studies in the UK and the US or other developed economies (for example, study numbers 10, 12 and 13), however not many are set in developing economies. Most studies were conducted using survey questionnaires (for example, study numbers 2, 4 and 6). Very little research has been done using a qualitative approach based on interviews (for example, study numbers 5a-b and 7). Also, few have focused on the adoption and use of GAS across different audit firm sizes (for example, study numbers 8, 9, 10, 15 and 16). Figure 3 also shows that most studies have focused on the adoption and use of GAS by individuals rather than firms as a whole and have used the Unified Theory of Acceptance and Use of Technology (UTAUT) (for example, study numbers 4, 14 and 10) and Technology Acceptance Model (TAM) (for example, study numbers 2 and 11) as their theoretical basis. In contrast, the present study interviews participants from a range of audit firms in size as well as

regulators and focuses on a developing economy using the Technology, Organisation and Environment (TOE) framework.

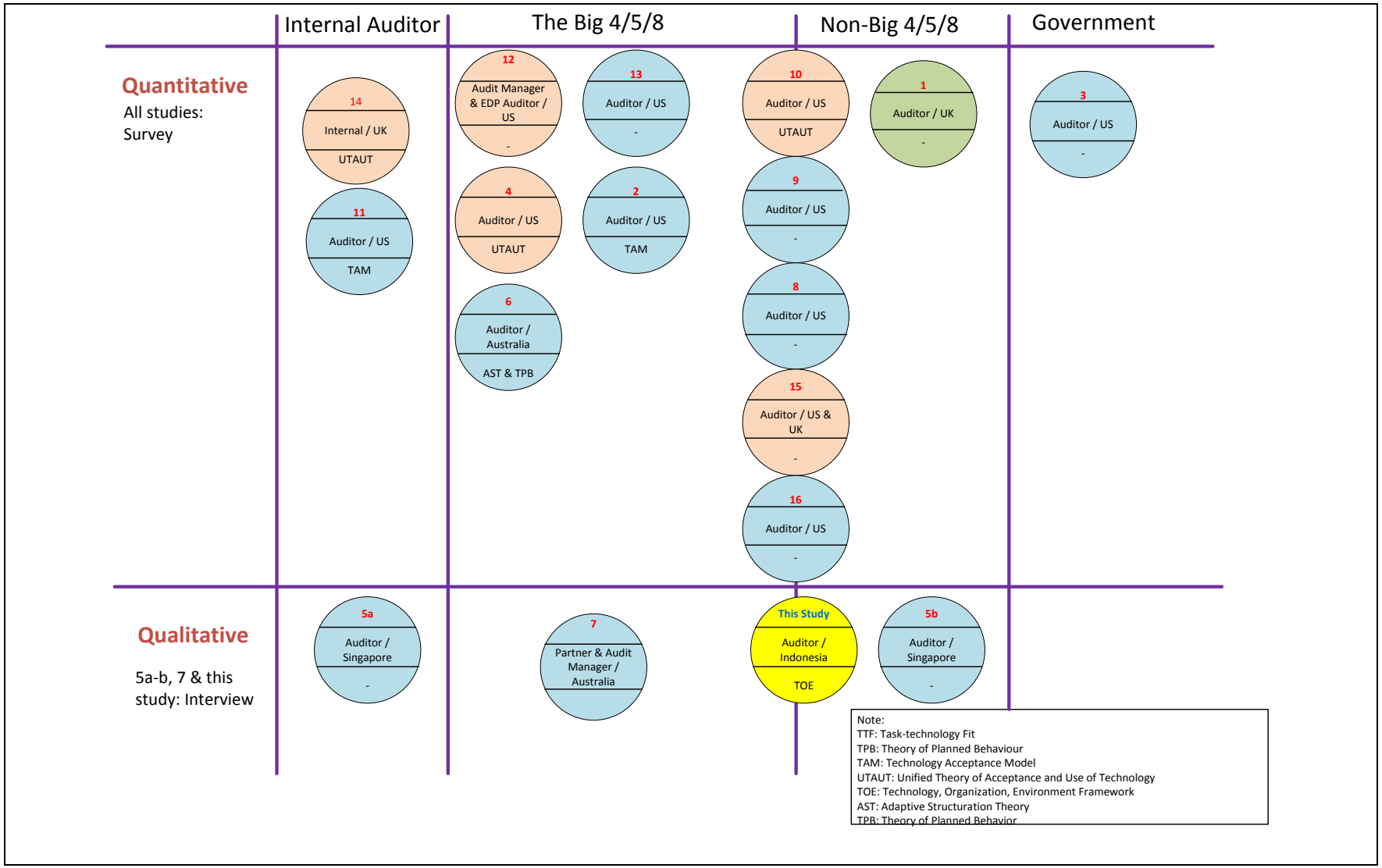


**Figure 2.3 - Mapping of Previous CAATs or GAS-related Studies**

Table 2.1 Previous CAATs or GAS-related Studies

| No | Author(s) | Year | Country | Focus | Size of Auditing Firm | Method | Theory / Framework / Model | CAATs Type |
|---|---|---|---|---|---|---|---|---|
| 1 | Ahmi & Kent | (2013) | UK | External Auditor | Small and Medium-sized Audit Firms | Quantitative – Web-based Survey | - | GAS |
| 2 | Bedard et al | (2003) | US | Senior/staff Auditors (Workpaper preparers) | International audit firm | Quantitative – Survey | Technology Acceptance Model (TAM) | GAS |
| 3 | Braun & | (2003) | US | External | Government | Quantitative – | - | GAS (ACL) |

| No | Author(s) | Year | Country | Focus | Size of Auditing Firm | Method | Theory / Framework / Model | CAATs Type |
|---|---|---|---|---|---|---|---|---|
| | Davis | | | Auditor | | Internet survey | | |
| 4 | Curtis & Payne | (2008) | US | External Auditor | Big four | Quantitative – Case study & Questionnaire | Unified Theory of Acceptance and Use of Technology (UTAUT) | Unspecified CAATs |
| 5a-b | Debreceny et al. | (2005) | Singapore | Internal Auditor and External Auditor of Financial Institutions | Local auditing firms | Qualitative – In-depth interview | - | GAS |
| 6 | Dowling | (2009) | Australia | External | The six | Quantitative – | Adaptive | Unspecified |

| No | Author(s) | Year | Country | Focus | Size of Auditing Firm | Method | Theory / Framework / Model | CAATs Type |
|---|---|---|---|---|---|---|---|---|
| | | | | Auditor | largest international audit firms | Survey | Structuration Theory<br><br>Theory of Planned Behaviour | CAATs |
| 7 | Dowling & Leech | (2007) | Australia | Partners Audit Managers | Five international audit firms: Big four & 1 large mid-tier international audit firm | Qualitative – Interview | - | GAS |

| No | Author(s) | Year | Country | Focus | Size of Auditing Firm | Method | Theory / Framework / Model | CAATs Type |
|---|---|---|---|---|---|---|---|---|
| 8 | O'Donnell & Schultz | (2003b) | US | Senior External Auditor | Audit firms from all sizes | Quantitative – Survey | - | GAS |
| 9 | Janvrin et al. | (2009) | US | External Auditor | Big four National Regional & Local Firms | Quantitative – Survey | - | Unspecified CAATs |
| 10 | Janvrin et al. | (2008f) | US | External Auditor | Big four National Regional & Local Firms | Quantitative – Survey | Unified Theory of Acceptance and Use of Technology (UTAUT) | Unspecified CAATs |
| 11 | Kim et al. | (2009) | US | Internal | - | Quantitative – | Technology | Unspecified |

| No | Author(s) | Year | Country | Focus | Size of Auditing Firm | Method | Theory / Framework / Model | CAATs Type |
|---|---|---|---|---|---|---|---|---|
| | | | | Auditor | | Internet Survey | Acceptance Model (TAM) | CAATs |
| 12 | Lovata | (1988b) | US | External Auditor:<br>- Audit manager<br>- EDP auditor | Big 8 | Quantitative – Survey | Davis and Weber Model of Stress and the Systems Hierarchy<br><br>Cushing and Loebecke Structure / Technology Distinctions. | GAS |
| 13 | Lovata | (1990) | US | External | Big 8 | Quantitative – | Cushing and | Unspecified |

| No | Author(s) | Year | Country | Focus | Size of Auditing Firm | Method | Theory / Framework / Model | CAATs Type |
|---|---|---|---|---|---|---|---|---|
| | | | | Auditor | | Survey | Loebecke Structure / Technology Distinctions. | CAATs |
| 14 | Mahzan & Lymer | (2006) | UK | Internal Auditor | - | Mixed – Survey & In-depth interview | Unified Theory of Acceptance and Use of Technology (UTAUT) | Unspecified CAATs |
| 15 | Manson et al. | (1998) | US UK | External Auditor | Big 6 Middle sized audit firms | Quantitative – Survey | - | GAS |
| 16 | Janvrin et al. | (2008b) | US | External Auditor | Big four National | Quantitative – Survey | - | GAS |

| No | Author(s) | Year | Country | Focus | Size of Auditing Firm | Method | Theory / Framework / Model | CAATs Type |
|---|---|---|---|---|---|---|---|---|
| | | | | | Regional & Local Firms | | | |

### *2.4.1. CAATs or GAS Adoption or Acceptance*

There is a limited number of studies on CAATs or GAS adoption and acceptance. GAS adoption and acceptance-related studies are predicated on the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Technology Acceptance Model (TAM) as their theoretical base. A discussion about UTAUT and TAM will be presented in the next section.

Bedard et al. (2003) investigated the effects of training on the US based external auditor's acceptance of electronic working paper systems and used TAM as the theoretical framework. The participants were external auditors from international audit firms and consisted of two groups, one prepared working papers (audit seniors and staff) and the other reviewed them (managers and partners). The study aimed to determine whether training created a perception change towards ease of use and system usefulness. It investigated whether training increased the participant's perception regarding computer self-efficacy and task self-efficacy. The working paper preparers and reviewers were given two-day and one-day training relevant to their respective roles. Questionnaires were distributed among the participants before and after training. The results showed that there was an improvement in task self-efficacy, computer self-efficacy, perceived ease of use and perceived system usefulness in the preparation of working paper preparers. However, the results were different for working paper reviewers and only minor improvements were found. In general, the results imply that training is an important factor because it increases system acceptance. Bedard et al. (2003) investigated the acceptance of GAS in an external audit setting and Kim et al. (2009) investigated IT acceptance in an internal audit setting and used TAM as the theoretical basis. In terms of the use of GAS, their findings support Janvrin, Bierstaker and Lowe (2008) which claim that internal auditors are familiar with the basic features of GAS but not the advanced functions.

Moreover, the study found that internal auditors perceive usefulness of the basic features as more important and ease of use had a significant influence on the acceptance of the advanced features.

Curtis and Payne (2008) investigated factors in the US audit context that influence the implementation of new technology. This experimental study found that audit firms can influence the use of technology, especially for long-term budget planning and evaluation processes. It was found that the auditors' personality can contribute to the decision to implement audit technology; risk taking auditors are more likely to implement a new technology regardless of budget pressure. A limitation of this study identified by the researcher is that the respondents were external auditors from one Big four firm therefore the results cannot be applied to firms of different sizes.

Previous studies have tested well-known theories (see, for example, Bedard et al., 2003; Curtis and Payne, 2008; Janvrin, Lowe & Bierstaker, 2008) to predict the acceptance of CAATs or GAS and the following research developed models that identify factors influencing CAATs or GAS adoption and acceptance.

Dowling (2009) introduced a theoretical model of factors that influence audit support system use and surveyed external auditors of the six largest international firms in Australia to test the model. The results indicate that attitude, perceived normative pressure and self-efficacy can be used to predict the intention to use an audit support system. Moreover, intention to use and external controls determine the use of an audit support system (Dowling, 2009). As with several other studies, Dowling's (2009) study focuses on the largest firms and it is unclear whether the results can be applied to smaller ones. Moreover, the results reflect the auditor's

individual intention to use audit support system rather than the intention of the audit firm itself.

Ching-Wen and Wang (2011) developed a selection model for auditing software that used commercially available software such as *ACL*, *IDEA* and *Focaudit*. They conducted a focus group discussion in an internal audit setting and used analytic network process to evaluate the criteria and decision making factors. The findings covered four decision making criteria that are technical support and service provided by the software vendor, cost, systems functions and data processing. Their findings indicated that system function is the most important criteria and the system stability is the most important factor in audit software. They defined system function as hardware requirements, user friendliness of operating interface, data storage capacity, system stability and security. System stability was described as whether or not the system is reliable over time. As mentioned above, respondents rated technical characteristics highly (such as technical support and system stability) instead of cost or human resources. With reference to the present study, it is unclear whether the results of Ching-Wen and Wang (2011) can be duplicated if applied to all types of audit software, including internally developed audit software.

A new model of GAS use was also introduced by Ahmi and Kent (2013). They surveyed external auditors and found the presence of nine GAS adoption factors: client, job relevance, audit profession, cost and resources (GAS implementation), cost and resources (audit engagement), technological and IT availability, personal experience, personal knowledge and management support. The authors found that technological and IT availability, auditing aspects (such as audit methodology, auditor's professional judgement and audit standards) and support for management were rated as highly important factors for GAS adoption. To

obtain adoption factors, Ahmi and Kent (2013) surveyed external auditors from mid-tier and small size audit firms across the UK. Hence the adoption factors cannot be considered as applicable to Big four firms. A limitation of this study is that it is unknown whether the adoption factors applicable in Big four firms would be similar to those found in mid-tier and smaller sized firms and, moreover, the extent of the differences have not been identified.

Previous studies on CAATs or GAS acceptance and adoption found that several factors, for example, computer-related training (Bedard et al., 2003, Janvrin et al., 2008c), the personality of the auditor (Curtis and Payne, 2008) and user attitude (Ahmi and Kent, 2013, Dowling, 2009) influence the decision to adopt and accept CAATs or GAS. However, most studies focus on factors that impact acceptance at an individual level (Bedard et al., 2003, Janvrin et al., 2008c, Curtis and Payne, 2008, Dowling, 2009, Ching-Wen and Wang, 2011, Ahmi and Kent, 2013). However, the current study offers evidence about possible adoption factors at an organisational level as well as individual level and assumes that it is mainly the audit firm's decision and not that of an individual auditor. Brooks and Lanza (2006) suggest that support from management is needed especially with regards to companywide applications. Similarly, Sirois and Simunic's (2010) model assumes that audit quality is the result of technology investment rather than effort. It is apparent from previous literature (Bedard et al., 2003, Janvrin et al., 2008c, Curtis and Payne, 2008, Dowling, 2009, Ching-Wen and Wang, 2011, Ahmi and Kent, 2013) that there is a lack of research across a range of audit firms into studies that have examined GAS adoption at an organisational level.

### *2.4.2. CAATs or GAS Use*

Manson et al. (1998) compared audit automation between external auditors from the Big 6 and mid-tier firms in the UK and the US They sent a postal survey to respondents to obtain answers about the use of audit automation and the extent of its use. It included questions

about the development and implementation of audit automation and its effect on the audit process with specific emphasis on human resources, recruitment and training. It found that IT use in the US was more advanced than that in the UK and the extent of automation depended on the use of general-purpose packages such as spread sheets and word processing programs for planning, controlling and recording functions. The findings also showed that audit automation provides benefits to audit firms, the greatest of which is improved audit quality. The study documented the connection between the use of audit automation and the audit process however it was unclear about the type of audit automation used by the respondents. The results measured the use of audit automation based on the use of personal computers in the respondents' firms.

Debreceny at al.'s (2005) study consisted of interviews with internal and external auditors to measure their use of GAS in the Singapore banking sector and found the extent and range of use varied. Internal auditors did not use GAS for routine audit activities but for substantive testing only during special investigations. However, most internal auditors from participating banks used *ACL*. In the banking industry, GAS can be used to extract data, identify dormant accounts and verify the completeness and accuracy of the data. This application applies simple queries such as data sorting, filtering and set criteria to display particular data hence the level of GAS use can be categorised as basic. The research concluded that external auditors did not use GAS because their emphasis was on compliance and the effectiveness of the bank's internal controls. The limitations of Debreceny et al.'s (2005) study are that it included a small number of participants: Three internal auditors and three external auditors. Moreover, their study focused on the banking industry that excludes its wider application to other industries or other country contexts. The present study includes 27 external auditors from different sizes of audit firms and does not focus on a specific industry. It explores wider

perceptions and detailed opinions of auditors about GAS use, benefits, adoption and hindrance factors.

Janvrin, Bierstaker and Lowe (2008d) surveyed 181 external auditors' use of audit applications across a diverse group of firms. The findings showed that external auditors use several basic audit applications, such as analytical procedures, report writing, electronic working papers, internet search tools and sampling. However the results did not find the use of advanced features such as digital analysis, expert systems, test of online transactions, database modelling and continuous transactions monitoring. Furthermore, the importance of IT varied across firms. It was reported that auditors from the Big four firms rated the importance of audit applications higher than non-Big four auditors, especially for planning, electronic working papers, internal control evaluation and sampling. In terms of the use of audit application to identify high-risk areas (such as fraud review application), auditors from national and Big four firms were in agreement. The limitations of Janvrin, Bierstaker and Lowe's (2008d) study are that they used the term "audit applications" to define all tools designed to support auditors in conducting an audit. Moreover, they did not differentiate which application was developed internally or commercially purchased. Therefore, it is unclear which audit application is most frequently used in conducting an audit.

In a recent study from the UK, Ahmi and Kent (2013) examined the use of GAS by small and medium-sized audit firms and found that more than 70 per cent of respondents did not use GAS and some were unaware of its existence. However, respondents who used GAS stated it was to evaluate fraud risk, test journal entries and other adjustments. Ahmi and Kent (2013) surveyed external auditors from mid-tier and small sized audit firms across UK and hence, their findings may not be applicable to Big four firms. It is unknown whether the use of GAS

in Big four firms is different to its use in mid-tier and small size firms. Moreover, the extent of difference has not been identified.

Previous research indicates that the majority of external auditor's use of GAS is minimal and limited to a basic level (Janvrin et al., 2008a, Ahmi and Kent, 2013, Debreceny et al., 2005, Manson et al., 1998). However there are examples of advanced use and that is discussed in the following studies.

O'Donnell and Schultz (2003a) found the choice of audit methodology motivates a firm to change their audit support software. They conducted a field experiment of external auditors to evaluate whether business-process-focused or transaction-cycle-focused audit software provided better analytical procedures for fraud detection during the planning-phase and assumed each application provided different data presentation formats. For example, the business-process-focused software arranges the client's information around business activities whereas the transaction-cycle-focus arranges the client's information by account classification. The study found that auditors who used business-process-focused software detected more risk compared to those who used transaction-cycle-focused software. The study did not specify the extent of audit support software used during the planning-phase as it focused on the presentation format of client's data. However, the results provide insights for audit software developers especially with reference to the presentation of information and its influence on auditor performance in the identification of business risk or fraud.

Cleary and Thibodeau (2005) and Nigrini and Miller (2009) provide another example of the advanced use of GAS. They studied digital analysis application using Benford's Law, that is "an audit technique that is applied to an entire population" (Nigrini and Miller, 2009). This is

one audit software feature written in *ACL* or *IDEA*. It is used to detect data anomalies, such as unusual transactions, trends, events and fraud by testing the first, first-two, or the last-two digit patterns of transactional data. Cleary and Thibodeau (2005), compared the use of statistical tests, Chi-squared tests and digital analysis, to find type I auditing errors. They found once digital analysis was used, the probability of finding a type I error and actual fraud increased. Cleary and Thibodeau (2005), were concerned that Benford's Law states data cannot be processed after "human intervention has occurred" , and examples of this are rent expenses or a person's height. To address this concern, Nigrini and Miller (2009) introduced examples of the second-order test based on Benford's Law that can be applied to any set of transactional data. These studies describe only the analysis stage of Benford's Law, therefore its application in audit testing remains unclear.

In summary, few studies have focussed on the use of GAS. Moreover, previous research has found limited use of GAS by auditors. Debreceny et al. (2005) found the difficulty of using GAS is a factor that contributes to its limited use. This difficulty may be caused by auditors' lack of experience with CAATs as found by Asgari et al. (2013). Ahmi and Kent (2013) document the perceived limited benefits of GAS as an inhibition to use by external auditors and Greenstein-Prosch et al. (2008) reported that auditing professionals in the US and Germany lacked knowledge of audit automation. The difficulty of obtaining and analysing electronic data was raised by Brooks and Lanza (2006) as a barrier to GAS use and suggested that initiatives are needed from stakeholders such as partners, the regulator and professional bodies. Moreover, they also recommended a comprehensive study is also needed to obtain insights about factors that drive GAS adoption and use and the present study seeks to address this gap in the literature.

## 2.5 The Impact of Adoption and Use of GAS to an Audit Firm's Competitive Advantage

The IT literature documents the impact of IT use on the competitiveness of companies (Eraqi, 2006, Peña-Vinces et al., 2012, Powell and Dent-Micallef, 1997). For example, Bakos and Treacy (1986) categorised four areas of opportunities for competitive advantages provided by IT use and these are improvement in operational efficiency, enhanced cooperative information systems, product innovation and increased bargaining advantages with suppliers and customers. More specifically, the IT innovation literature claims competitive advantage can be manifested in different forms relative to the characteristics of the company and the IT that is adopted. For example, Zhu et al. (2006) defined competitive advantage as that which increases sales and reduces costs and it will be interesting to identify whether Indonesian auditors perceive a competitive advantage gained by the adoption and use of GAS.

Some auditing literature has recorded the benefits of IT adoption for audit firms however the discussion has mainly focused on IT implementation in general rather than GAS. For example, Omoteso et al. (2010) found the implementation of IT in audit firms creates a leaner organisation structure, because its use reduces the number of administrative or junior audit staff. Auditing literature describes efficiency, accuracy and increased productivity as benefits gained from the use of IT (see, for example, Banker et al. (2002), Braun and Davis (2003), Dowling and Leech (2007) and Hsihui et al. (2011)). However, most of literature has discussed the adoption and use of IT in general or particular audit technology. Few studies have examined empirically the competitive advantage of the adoption and use of GAS. This is surprising given that potential benefits will enable them achieve their competitive advantage.

Despite the benefits that are available from IT implementation in audit practice, it is anticipated that not all audit firms are willing to invest in the infrastructure due to a lack of financial resources. Extensive studies have been conducted into the adoption of technology by larger firms (see Banker et al. (2002), Bierstaker et al. (2001), Dowling and Leech (2007) and Curtis and Payne (2008)) and prove that larger firms are leaders in audit technology adoption. Janvrin, Bierstaker and Lowe (2008d) reported the use of IT in Big four firms is extensive due to their resources that enable them to purchase and implement it and hire appropriate staff and concluded that the Big four firms provide higher quality audit resulting from the IT adoption. This conclusion supported Dowling and Leech's study (2007) that interviewed partners from Big four and one large mid-tier firms and found that the use of audit support systems increases audit quality through compliance with auditing standards and methodology. However, empirical research claims larger firms provide a higher quality audit due to reasons unrelated to IT use.

In several studies, audit quality has been measured by metrics such as the calculation of discretionary accruals or the issuance of going concern reports by firms (see, for example, Behn, Choi and Kang 2008; Davidson and Neu 1993, Francis and Yu 2009, Lawrence, Minutti-Mezza and Ping 2011) . Limited literature is available that discusses audit quality as a result of IT adoption and exceptions include Janvrin, Bierstaker and Lowe (2008d) and Dowling and Leech (2007) as cited above. Manson et al. (1998) stated that through automation, audit quality improvement outweighed other benefits such as cost reduction. However, they argued that this is relative to the size of audit firms. For example, medium size firms in UK reported that audit cost reductions were a significant benefit to derive from audit automation. Moreover, Sirois and Simunic (2010) developed a model of the production of audit quality that assumes audit quality is the result of technology investment rather than

audit effort. In other words, the effort of auditors in seeking to provide high quality audits was not sufficient in itself to guarantee a high quality audit. This effort needs to be supported by investment in technology. They also claimed that the size of investment in audit technology was a significant predictor of audit quality and fees.

Although Sirois and Simunic's (2010) model has not been extensively tested, their assumption regarding the connection between audit fees and audit technology investment is important to consider, especially once audit firms implement a particular audit technology. The contention that larger audit firms provide higher quality audits and therefore can charge higher fees has been extensively researched (see, for example, De Angelo 1981, Choi et al. 2008, Choi et al. 2010). They asserted that larger firms tend to not compromise the quality of an audit to avoid reputation loss in the case of failure. However, there is an exception with Arthur Andersen and their perceived lack of independence. To avoid audit failure, larger firms maximize their investment in IT infrastructure, auditor training, facilitating knowledge sharing between auditor and implementing sophisticated techniques including computerized processes (Choi et al., 2010, Sirois et al., 2012, Vera-Muñoz et al., 2006). Choi et al. (2008) predicted smaller firms will increase their audit fees once there is a shift in the regulatory regime from a weak to a strong position. They sampled countries such as, India, Pakistan, and South Africa and categorised these countries as weak legal regimes countries. They also included Australia, Hong Kong, New Zealand, UK and US as strong legal regimes countries. The study found that the increase in audit fees is to compensate for the increase of effort necessary to avoid failure and legal liability.

In summary, many studies have discussed the benefits of IT implementation in companies even though there is a scarcity of research in the auditing arena. Existing auditing literature

on this subject fails to identify the type of audit technology that was used. For example, Manson et al. (1998) studied audit automation and defined it as general-purpose packages such as spreadsheet and word processing programs. Janvrin, Bierstaker and Lowe (2008d) investigated basic and advanced audit application across a diverse group of firms. Dowling and Leech (2007) examined the use of audit support system in the Big four and one mid-tier firm. These studies concurred that the use of audit technology in general contributes to the increased of audit quality. Given these studies did not specify the type of audit technology used and were conducted in a developed economy setting, it is unclear whether the adoption and use of GAS provides similar benefits for developing economies, specifically for Indonesian audit firms.

## 2.6 Theoretical Framework of the Present Study

The CAATs or GAS acceptance and adoption-related studies in the auditing context are limited so in response, information system (IS) literature was reviewed to identify factors that determine its organisational acceptance and adoption. Technology acceptance theories describe individual acceptance of a new information system (IS) is determined by intention to use (Davis, 1989). In the IS field, technology acceptance is an important area of research and two well-known theories/models are TAM (Davis, 1989, Davis et al., 1989) and UTAUT (Venkatesh et al., 2003). These theories have been applied across several environments including the US (Venkatesh et al., 2003, Adams et al., 1992, Agarwal and Prasad, 1999, Venkatesh and Davis, 2000), Hong Kong (Hu et al., 1999, Hong et al., 2002, Chau and Hu, 2001) and Taiwan (Wang et al., 2003).

Most previous CAATs or GAS adoption and acceptance-related studies adopted UTAUT (Janvrin et al., 2008c, Curtis and Payne, 2008, Greenstein-Prosch et al., 2008) and TAM

(Bedard et al., 2003, Kim et al., 2009). Therefore, existing CAATs or GAS adoption and acceptance-related studies mainly focus on individual rather than the organisational level. However, since UTAUT and TAM were used to underpin existing studies, it is important for the present study to acknowledge and discuss them.

TAM and UTAUT measure the individual's intention to use a new technology. However, there are other theories that explain the adoption of a new technology at organisational level, such as the technological, organisational and environmental (TOE) framework and diffusion of innovation (DoI) theory. The next section will provide the rationale for the theory adopted in this current study. The discussion categorises TOE and DoI as organisational level theories and UTAUT and TAM as individual level theories of adoption and acceptance.

## 2.7 Organisational Level Theories of IT Acceptance and Adoption

### *2.7.1. Technology, Organisation and Environment (TOE) Framework*

The TOE framework was developed by Tornatzky and Fleischer (1990b). The TOE framework's foundation originates from DoI research that is discussed in the following section. The framework identifies the influences on a firm's decision to adopt and implement innovations. These influences are technological, organisational and environmental. Originally the TOE framework was described by Tornatzky and Fleischer (1990b) as seen in Figure 2.4.

The framework is consistent with innovation theory that emphasizes technological and organisational aspects (Rogers, 1995). Tornatzky and Fleischer (1990b) included the external environment dimension with the assumption that companies need to set up a communication mechanism with government, competitors, suppliers and consumers in order to reach the

adoption decision. The TOE framework has been applied extensively in various IS studies (see Appendix 2). For example, the framework was used on studies of electronic data interchange (EDI) adoption (Kuan and Chau, 2001), e-business (Zhu et al., 2003b, Zhu and Kraemer, 2005), open source systems (Chau and Tam, 1997, Dedrick and West, 2003, Ven and Verelst, 2012), enterprise resource planning (ERP) (Ming-Ju and Woan-Yuh, 2008), electronic customer relationship management (e-CRM) (Te-Ming et al., 2005), e-government (Pudjianto and Hangjung, 2009) and aviation systems (Scott, 2007). Although specific factors used within the three contexts, i.e. technology, organisation and environment, varied across different studies, overall support for the TOE framework was indicated. The current study extends the use of the TOE framework to the external audit setting with particular reference to the adoption of GAS.

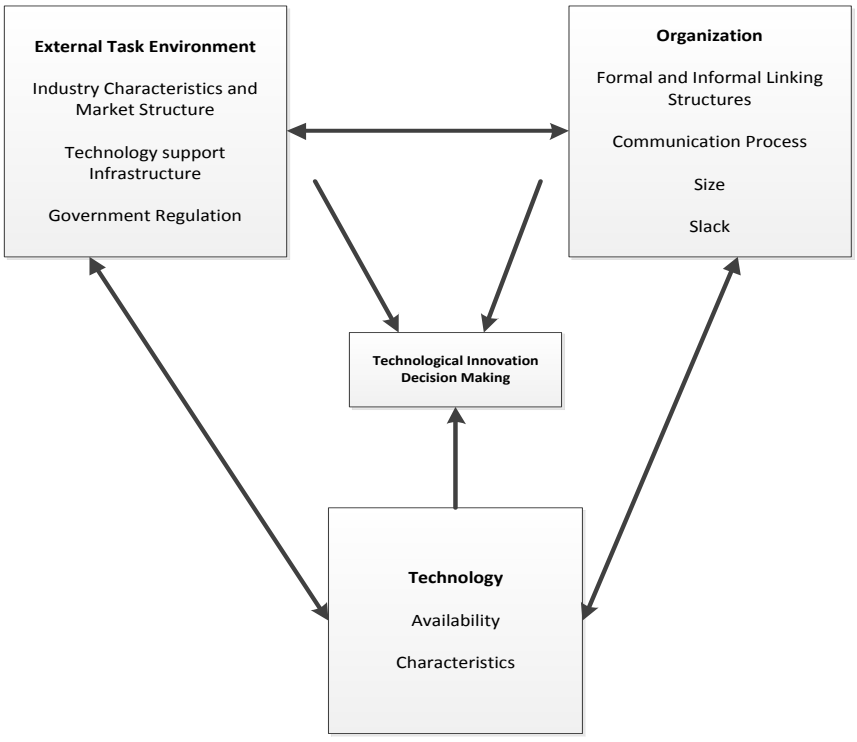


**Figure 2.4 - The Technological, Organisational, Environmental (TOE) Framework**

**(Tornatzky and Fleischer, 1990, p153)**

#### *2.7.1.1. Technological Context*

The technological context describes the "internal and external technologies relevant to the firm" (Oliveira and Martins, 2011). This includes existing technologies inside the firm as well as the availability of technologies in the market. In an audit context, the firm may want to adopt GAS if it is compatible with its clients' existing IT platforms. Compatibility with audit tasks and ease of use are also relevant considerations as a technological driver to the adoption of GAS. Dedrick and West (2003) interviewed 15 MIS managers and found that the skills of existing IT workers and fitness to task are factors that need to be considered when companies decide to adopt open source software such as Linux. There were several technological constructs in previous studies, however IT infrastructure was the most frequently used as a measurement tool: technology competence (Zhu et al., 2003a, Zhu and Kraemer, 2005), technology integration (Zhu et al., 2003b, Te-Ming et al., 2005), and the IS or IT infrastructure (Lin and Lin, 2008, Scott, 2007, Ming-Ju and Woan-Yuh, 2008, Pudjianto and Hangjung, 2009). Existing studies found mixed results regarding the significance of IT infrastructure on IT adoption. For example, Lin and Lin (2008), Scott (2007), Zhu et al. (2003a), Zhu and Kraemer (2005) and Zhu et al. (2003b) found that IT infrastructure was significant to IT adoption. However, in an ERP and e-government adoption setting, IT infrastructure was found to be insignificant (Ming-Ju and Woan-Yuh, 2008, Pudjianto and Hangjung, 2009).

#### *2.7.1.2. Organisational Context*

The organisational context was defined by Tornatzky and Fleischer (1990b) as firm size and scope, centralisation, formalisation, complexity of managerial structure, the quality of human resources, and the amount of resources available internally. In an audit context, the relevant factors are firm size (Big-4, medium and small-sized firms), IT skills of the auditors and the IT capital budget. Previous studies describe firm size as one of the organisational constructs

that positively influences technology adoption. However, Zhu et al. (2003b) found that firm size negatively impacts on e-business adoption. Curtis and Payne (2008) found that top management support in audit firms influenced the use of new technology by auditors. In previous TOE studies, top management support (Pudjianto and Hangjung, 2009) occurred in different forms, such as financial resources (Zhu et al., 2003b), financial commitment (Zhu and Kraemer, 2005), IT capital budgets (Dedrick and West, 2003), software and switching costs (Ven and Verelst, 2012). The existing studies provided consistent findings about top management support as a significant influence on IT adoption. In terms of the availability of IT expertise or staff who have relevant IT skills, Zhu et al. (2003a), Lin and Lin (2008) and Pudjianto and Hangjung (2009) found that it was an important factor in IT adoption.

#### *2.7.1.3. Environmental Context*

The environmental context is the context in which a firm conducts its business – its industry, competitors, access to resources, and dealings with government (Tornatzky and Fleischer, 1990b). Dedrick and West (2003) found that the availability of external skills, such as integrators or consultants was essential for some organisations. In an audit context, levels of support from professional bodies and regulators, vendors of GAS, the client's size and industry may motivate GAS adoption.

Most of the existing studies have used industry pressure, government or regulations, competition and consumer factors to measure the external or environmental context. Kuan and Chau (2001) compared the perceptions of EDI adoption factors between the adopter and non-adopter firms and found that adopter firms perceived higher pressure from government than non-adopter firms. Zhu et al. (2003b) found government regulations or government contributed to e-business adoption and implementation in developing countries. They sampled and classified Denmark, France, Germany, Japan and the US as developed countries,

and countries such as Brazil, China and Mexico as developing countries. They claim that government regulation in the sampled developing countries provide a reliable legal e-business market environment that include consumer protection due to an asymmetrical market environment.

However findings were different regarding the influence of regulations or government between developing and developed economies. They found that government regulation was perceived as more important in developing rather than in developed economies. Scott (2007) claimed that government and industry regulation could be used to ensure compliance over resources. Zhu and Kraemer (2005) and Pudjianto and Hangjung (2009) found that regulatory support was significant to e-business and e-government adoption. However Ming-Ju and Woan-Yuh (2008) found it was not significant for ERP adoption due to the risk involved such as inadequate training of end-users, lack of vendor support and lack of top management commitment (Aloini et al., 2007).

Ming-Ju and Woan-Yuh (2008) found that competitive pressure was not significant in ERP adoption, however studies in different technology adoption settings found it to be important (Zhu et al., 2003a, Zhu et al., 2003b, Te-Ming et al., 2005, Zhu and Kraemer, 2005, Lin and Lin, 2008, Scott, 2007, Pudjianto and Hangjung, 2009). Firms adopt IT to comply with government regulations or to compete effectively and to improve the quality of customer service. Studies found that customer readiness to accept a firm's IT adoption is another important consideration (Zhu et al., 2003a, Te-Ming et al., 2005, Lin and Lin, 2008). Furthermore, Zhu et al. (2003a) found that the lack of customer readiness was a significant inhibitor to e-business adoption.

In summary, previous studies found that different types of IT such as ERP, e-CRM and e-government provide different and inconsistent adoption factors results with specific reference to the technological and environmental contexts. For example, in terms of the technological context, Lin and Lin (2008), Scott (2007), Zhu et al. (2003a), Zhu and Kraemer (2005) and Zhu et al. (2003b) found that IT infrastructure was significant to IT adoption. However, in an ERP and e-government adoption setting, IT infrastructure was found to be insignificant (Ming-Ju and Woan-Yuh, 2008, Pudjianto and Hangjung, 2009). In terms of the environmental context, Zhu and Kraemer (2005) and Pudjianto and Hangjung (2009) found that regulatory support was significant to e-business and e-government adoption. However Ming-Ju and Woan-Yuh (2008) found it was not significant for ERP adoption. In terms of the organisational context, previous studies indicated that it is consistent across different type of IT, except for the factor of company size.

### *2.7.2. Diffusion of Innovation (DoI)*

DoI studies the way innovation is communicated over time among the members of social systems (Rogers, 1995). DoI can be applied for measuring both individual and organisational level of IT innovation. At the individual level, the unit of adoption is end-user and the innovation process follows five stages: end user obtains knowledge of an innovation, forms an attitude toward the innovation, reaches a decision to adopt or reject, implements of the new innovation and confirms the previous innovation decision and whether the innovation needs to be continued or stopped.

Tornatzky and Klein (1982) conducted a meta-analysis study and revealed the ten most frequently studied innovation characteristics which are compatibility, relative advantage, complexity, cost, communicability, divisibility, profitability, social approval, trialability, and

observability. However it was found that only compatibility[5], relative advantage[6], and complexity[7] were consistently significant. Where relative advantage and compatibility were positively related to adoption, complexity was negatively related to adoption. For example, Premkumar et al. (1994) found that technical and organisational compatibility are important determinants of implementation success. This finding was supported by Beatty et al. (2001) and Zhu et al. (2006). Zhu et al. (2006) believed that compatibility was the main factor in e-business adoption in European countries. However, Teo et al. (1995) found that compatibility was insignificant in the current and future adoption intention of EDI.

DoI explains the organisational level of IT adoption, unlike the TOE framework that focuses on technological and environmental aspects. The readiness of the internal user and management are important to IT adoption and DoI describes these aspects.

## 2.8 Individual Level Theories of IT Acceptance and Adoption

Technology acceptance has received much attention from IS researchers. The technology acceptance models employed in IS literature provide a starting point for exploring the issue in public accounting. As discussed previously, most of the existing studies about CAATs or GAS adoption and acceptance have applied UTAUT or TAM as the underlying theory. This section discusses UTAUT and TAM.

[5] Compatibility is defined as "the degree to which an innovation is perceived as being consistent with existing values" ROGERS, E. M. 1995. *Diffusion of Innovations,* New York, The Free Press.
[6] Relative advantage is defined as " the degree to which an innovation is perceived as being better than the idea it supersedes" ibid.
[7] Complexity is defined as " the degree to which an innovation is perceived as relatively difficult to understand and use" ibid.

### *2.8.1. Unified Theory of Acceptance and Use of Technology (UTAUT)*

The UTAUT was introduced by Venkatesh et al (2003) and has four core determinants of intention and use that are performance expectancy, effort expectancy, social influence and facilitating conditions. Moreover, it includes up to four moderators of key relationships that are gender, age, voluntary use, and experience (see Figure 2.5). UTAUT posits that these four determinants play an important role in user acceptance and usage behavior.

UTAUT integrates constructs from Reasoned Action Theory, Technology of Acceptance Model, Motivational Model, Theory of Planned Behavior, Model of Personal Computer Utilization, a combined Theory of Planned Behavior and Technology Acceptance Model, Diffusion of Innovation Theory and Social Cognitive Theory (Venkatesh et al., 2003). UTAUT has been tested in the voluntary and mandatory use of a different type of technology. The following is a discussion of each determinant in UTAUT.

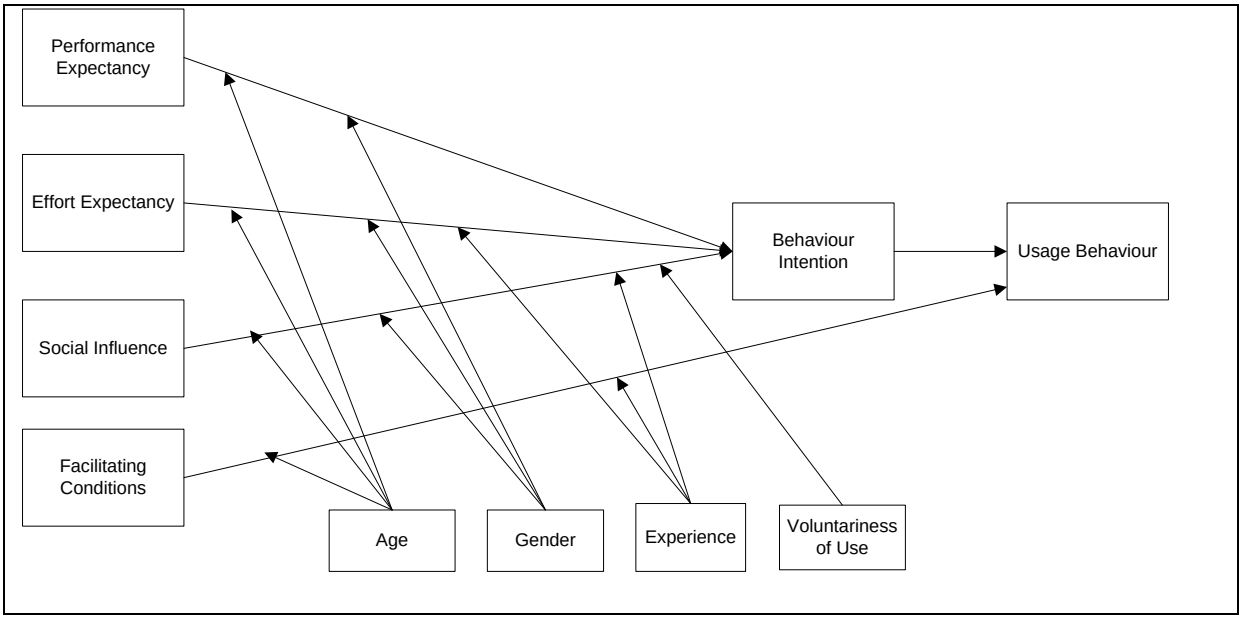


**Figure 2.5 - Unified Theory of Acceptance and Use of Technology (UTAUT)**

**Adopted from Venkatesh et al. (2003)**

*Performance Expectancy* is defined as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003) and it equates with perceived usefulness of TAM. Performance expectancy was the strongest determinant in predicting an individual's intention to use new technology and it was consistent in a voluntary or mandatory setting. In an audit context, Janvrin et al. (2008c) found that performance expectancy could increase the likelihood of technology use and was rated higher by auditors from larger firms than those from smaller firms.

*Effort Expectancy* is defined as "the degree of ease associated with the use of the systems" (Venkatesh et al., 2003) and equates with the perceived use of TAM. Effort expectancy is significant in both voluntary and mandatory settings; however only during the first time period of actual technology use. Janvrin et al. (2008c) said that effort expectancy was less significant for predicting the individual's intention to use technology.

*Social Influence* is defined as "the degree to which an individual perceives that significant others believe he or she should use the new system" (Venkatesh et al., 2003). Social influence is represented as a subjective norm in many theories, such as the Theory of Reasoned Action (TRA), the Theory of Planned Behavior (TPB) and TAM2 (Venkatesh et al., 2003). Hartwick and Barki (1994) suggest that a subjective norm is more important once system use is perceived as mandatory. Previous studies found that social influence has a significant effect on the use of new technology (Igbaria et al., 1996, Thompson et al., 1991). In contrast, several studies found that social influence does not have any significant effect on behavior intention (Chau and Hu, 2001, Davis, 1989, Mathieson, 1991, Venkatesh et al., 2003, Venkatesh and Morris, 2000). In an audit context, social influence was described as the auditors' perception that their direct managers encourage them to use CAATs or GAS and

this may influence their decision. Curtis and Payne (2008) found that auditors are more likely to use new technology once they are aware that the managing partner encourages it.

*Facilitating Conditions* was found to be non-significant in predicting intention but significant in determining usage (Venkatesh et al., 2003). The facilitating conditions determinant is defined as "the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system" (Venkatesh et al., 2003). It has been suggested that the absence of facilitating resources represents barriers to use and may hinder the formation of intention and usage (Venkatesh et al., 2003). IS research indicates that IT adoption is driven by the availability of company resources (Riemenschneider et al., 2003).

Although facilitating conditions are the least studied determinant in the existing theories/models, it is necessary to investigate whether this is a direct result of the external auditors' usage behaviour of audit software. Janvrin, Bierstaker and Lowe (2008d) found that Big four firms may provide their auditors with superior IT resources including the use of IT specialists. Moreover, previous research found that broad audit IT use is more extensive in Big four firms as compared with smaller firms (Manson et al., 1998). However, it needs to be noted that the US Statement on Auditing Standards (SAS) No. 94 requires that all auditors should consider IT as a part of the entity's control environment for clients for whom a significant amount of electronic forms are generated along the audit trail (Tucker, 2001).

*Behavioural Intention and Usage Behaviour*, UTAUT asserts that intention is an appropriate proxy through which to examine and predict a user's behaviour towards a particular technology or system. Results from previous research shows consistent results correlating behaviour with intention and usage (Davis, 1989, Davis et al., 1989, Moon and Kim, 2001,

Taylor and Todd, 1995, Venkatesh and Davis, 2000, Venkatesh et al., 2003). User behaviour is influenced by behavioural intention hence it plays an important role through which to predict usage behaviour. Curtis and Payne (2008) found that auditors are more likely to implement new technology after protracted evaluation and if the managing partner encourages it. However, Curtis and Payne (2008) assert that the implementation decision depends upon the personality characteristics of the external auditor, for example risk-seekers, are more likely to implement audit technology than risk-averse auditors.

Four key moderators were investigated to evaluate the influence of determinants had on intention to use and usage behaviour. Key moderators were gender, age, experience and voluntary use. Gender and age differences have been shown to exist in technology adoption contexts (Venkatesh et al., 2000, Morris et al., 2005). It is evident that gender, age and experience significantly moderate the influence of the determinants on behaviour intention. For example, older workers and women found it to be more challenging to employ new IT applications (Venkatesh and Morris, 2000, Venkatesh et al., 2003). UTAUT is one theory that considers gender, age and experience (Venkatesh et al., 2003). Experience was identified as a moderator in the Technology Acceptance Model 2 (TAM2). In this model, experience moderated the influence of the subjective norm toward behaviour intention (Venkatesh and Davis, 2000). Venkatesh et al. (2003) included voluntary use as a dummy moderator to differentiate the test results between voluntary and mandatory use situations.

### *2.8.2. Technology Acceptance Model (TAM)*

TAM was introduced by Davis (1989) and developed based on the theoretical grounding of Theory of Reasoned Action (Fishbein and Ajzen, 1975). Its aim was to provide a valid measurement for predicting and explaining technology use. TAM focuses on the influence of

external variables such as training, and intention to use as determined by perceived usefulness and ease of use (see Figure 2.6).

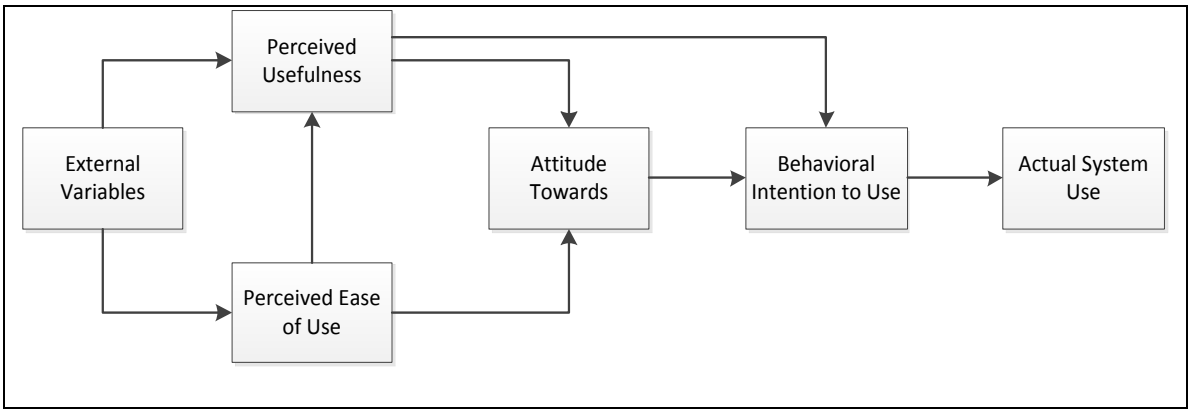


**Figure 2.6 - Technology Acceptance Model (TAM) Adopted from Legris et al. (2003, p193)**

Legris et al. (2003) claim that perceived usefulness and perceived ease of use are the two most important factors in explaining systems use and the following are explanations about the two factors.

*Perceived Usefulness* is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). Despite the fact that perceived usefulness is theorized as a direct determinant of behavior intention, there is strong evidence that perceived usefulness is also a direct determinant of usage behavior (Adams et al., 1992, Davis, 1989, Lederer et al., 2000, Igbaria et al., 1996, Thompson et al., 1991). Perceived usefulness is influenced by perceived ease of use (see Figure 3) and existing studies provide mixed results. For example, Davis (1989), Davis et al. (1989), Mathieson (1991) found that perceived ease of use has a positive influence on perceived usefulness, however Subramanian (1994), and Hu et al. (1999) found it to be insignificant.

*Perceived Ease of Use* is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). Evidence suggests that perceived

ease of use is a direct determinant of usage behavior (Adams et al., 1992, Davis, 1989, Igbaria et al., 1996, Lederer et al., 2000, Thompson et al., 1991).

Since it was introduced, TAM has been empirically tested by other studies, such as Adams et al. (1992), Subramanian (1994), and Lederer et al. (2000) and has been successful in predicting approximately 40% of technology use (Hu et al., 1999). TAM has been applied to predict individual behavior intention to use across a range of software categories, such as office automation tools, software development tools and business application tools (Legris et al., 2003)

## 2.9 Justification of the Use of TOE Framework in the Present Study

As described previously UTAUT and TAM provide an explanation about individual intentions to use IT and DoI focuses on both individual and organisational levels of IT adoption. The TOE framework serves as a useful framework for identifying the key factors for GAS adoption. The TOE framework was selected because it provides explanation about technological aspects such as the advancement of ERP or accounting software that are commonly used by companies. This technological advancement influences the way auditors conduct an audit. The technological dimension provides explanation about the internal IT infrastructure that may or may not support the adoption and use of GAS. These explanations are lacking in previous studies that use UTAUT or TAM as a theoretical basis, see for example, Janvrin et al. (2008c), Bedard et al. (2003) and Curtis and Payne (2008).

The TOE framework provides insights into the organisational dimension and includes considerations such as internal resources and the condition of audit firms, such as the level of partner support for GAS adoption and use, human resources competency and the budget to

invest in GAS, and auditor intentions toward GAS adoption and use. Other theories such as UTAUT and TAM describe individual auditor attitudes and do not focus on the organisational level of GAS adoption and use.

The organisational focus on GAS adoption is necessary because this study assumes its adoption and use is the audit firm's decision and not that of an individual auditor as it represents significant investment. This assumption is supported by Sirois and Simunic's (2010) model that found the size of investment in audit technology was a significant predictor of audit quality. In other words, the effort of auditors in seeking to provide high quality audits was not sufficient in itself to guarantee a high quality audit. This effort needs to be supported by investment in technology. It is apparent from the literature (Ahmi and Kent, 2013, Bedard et al., 2003, Curtis and Payne, 2008, Dowling, 2009, Janvrin et al., 2008c) that there is a lack of research into GAS adoption at an organisational level and across a range of audit firms.

DoI provides a description of organisational context however since DoI-related studies did not describe the external environment for GAS adoption, this study does not rely on it as an underpinning theory. The environmental aspect is best explained through the TOE framework as an external pressure that encourages audit firm to invest in GAS. For example the impact of Government regulations, support from professional accountancy bodies, clients and software vendors, and technological and organisational aspects of IT adoption appear to be under-studied in other CAATs or GAS-related research (see for example, O'Donnell and Schultz 2003; Debreceny et al. (2005) and Ahmi and Kent 2013).

The importance of examining environmental dimensions is due to the audit firms' need to comply with auditing standards and relevant regulations in conducting an audit. Moreover,

previous studies were conducted in developed economies and have indicated that professional and regulatory guidance provides encouragement for audit firms to use GAS (Ahmi and Kent, 2013, Bierstaker et al., 2001, Braun and Davis, 2003, Brooks and Lanza, 2006, Debreceny et al., 2005, Janvrin et al., 2008d, Janvrin et al., 2009, Manson et al., 1998, O'Donnell and Schultz, 2003a). However it remains unclear whether professional and regulatory guidance are considered important factors in GAS adoption. Therefore, it is necessary to investigate whether the Indonesian Government and professional accountancy bodies provide sufficient encouragement for audit firms to adopt and use GAS. Moreover, as there are few GAS vendors available in the audit software market in Indonesia a need has been created by audit firms for commercially available audit software. This situation needs to be investigated as to whether or not this state of matter contributes to GAS adoption and use.

Moreover, previous TOE-related studies indicated that adoption factors were found in different results regarding different types of IT (such as e-business, ERP, e-CRM and e-government) and in developed and developing countries. The TOE framework's feature provided the present researcher with motivation to study GAS adoption within the Indonesian context using the TOE framework.

## 2.10 Conclusion

The use of IT in business is now ubiquitous and has changed the way the transactional data is kept and maintained. It also influences the way auditors conduct an audit due to the increased reliance on capturing electronic evidence. Previous studies (for example, Braun and Davis, 2003; Devaraj and Kohli, 2003; Dowling and Leech, 2007) found that the increased use of IT by clients effects the audit process by encouraging firms to use sophisticated computer-based tools. The previous research indicates that the impact of IT on the audit process has been

significant in many ways, such as testing the client's internal controls and systems for accuracy, reliability and to assess risk by using GAS. However, it should be recognized that previous studies have focused on large audit firms in developed economies and the use of technology may be different in smaller firms.

Previous studies have described the use of IT terminology in audit practices by terms such as audit automation, audit application, audit support software, a computerized decision aid and CAATs. The present study use GAS to identify the use of IT by auditors. GAS refers to specific audit software and has specific functions such as to extract data, query, manipulate, summarize and analyse (Ahmi and Kent, 2013, Boritz, 2002, Debreceny et al., 2005). Although there are previous studies about GAS use and acceptance, few studies have examined potential factors driving its adoption.

The present study assumes that GAS adoption and use is the audit firm's decision and not that of an individual auditor. Previous studies on GAS acceptance and use indicate that several factors, for example computer-related training (Bedard et al., 2003), cost and resources (Ahmi and Kent, 2013) and user's attitude (Ahmi and Kent, 2013, Dowling, 2009) influence the decision to accept and adopt GAS and stress the importance of individual acceptance. Therefore, most previous CAATs or GAS adoption and acceptance-related studies adopted UTAUT and TAM and mainly focussed on the individual rather than on the organisational level. Moreover, the CAATs or GAS adoption, acceptance and use-related studies in the auditing context are limited, so in response, the IS literature was reviewed to identify factors that determine organisational acceptance and adoption. In addition, this study discusses the following theories: UTAUT, TAM, TOE and DoI prior to select an appropriate theory to underpin the study.

This study categorises the theories into individual level theories (which are UTAUT and TAM) and organisational level theories of IT acceptance and adoption (the TOE framework and DoI). The TOE framework is selected to underpin this study because it enables a deeper analysis of potential factors, such as technological, organisational and environmental in GAS adoption. The technological dimension provides explanation about the internal IT infrastructure that may or may not support the adoption of GAS. These deeper insights are lacking in previous studies that use UTAUT or TAM that rely on surveys. The organisational dimension includes considerations such as internal resources and the condition of audit firms, such as the level of partner support for GAS adoption and use, human resources competency and the budget to invest in GAS, and auditor intentions toward GAS adoption and use. Other theories such as UTAUT and TAM describe individual auditor attitudes and do not focus on organisational level of GAS adoption. DoI provides a description of organisational context however, since DoI-related studies did not describe the external environment for GAS adoption, this study does not rely on it as an underpinning theory. The importance of examining the environmental dimension is seen critical given the audit firms' need to comply with auditing standards and relevant regulations in conducting an audit. The environmental aspect is best explained through the TOE framework as an external pressure that may encourage an audit firm to invest in GAS.

# CHAPTER 3 - INDONESIAN CONTEXT

## 3.1 Introduction

This chapter provides an overview of Indonesia and describes the political, social, economic, information, communication and technological (ICT) context. The links of these processes to the establishment, development and role of public accountancy and auditing will be analysed and the historical journey of regulations and underpinning law from post-independence up to the period of reform (1998 – current) is also described. This section covers three eras beginning with President Soekarno's administration, followed by the new era, President Soeharto's government and post-Soeharto reform. In each era there was a significant and specific story to tell that influenced the profession and the formation of the Indonesian Institute of Accountants (IAI) and Indonesian Institute of Certified Public Accountant (IAPI) in 1957 is an example. In 2015, the ASEAN Economic Community (AEC) will commence operations, and due to its significance to Indonesia, this chapter includes a description of the challenges faced by local public accountants in this competitive environment.

## 3.2 An Overview of Indonesia

### *3.2.1. Social and Political Context*

Indonesia is located in Southeast Asia, an archipelago between the Indian and the Pacific Oceans (see Figure 3.7). The country occupies an area of 1.90 million square kilometres with a population of 251.16 million in July 2013. More than 50% of population is less than 30 years old and there are several ethnic groups and religions (MarketLine, 2013, 2014b). MarketLine (2013) describes Indonesia's ethnic composition as follows, Javanese (40.6%), Sundanese (15%), Madurese (3.3%), Minangkabau (2.7%), Betawi (2.4%), Bugis (2.4%),

Banten (2%), Banjar (1.7%), other or unspecified (29.9%). Islam is the main religion practised by 86.1% of population, Christianity at 8.7% with 5.7% Protestant and 3% Roman Catholic (3%), Hindu (1.8%), and other or unspecified faiths at 3.4%. These conditions make Indonesia a pluralist society and vulnerable to ethnic and religious intolerance especially toward minorities.


**Figure 3.7 - Map of Indonesia (source: www.ezilon.com)**

Jakarta, located in Java, is the capital city of Indonesia with a population of approximately ten million people and the centre of business activities. In 2011 there were 1451 large and medium scale manufacturing companies located in Jakarta (BPS, 2013). Moreover, more than 50% of audit firms are located in Jakarta with the remainder in neighbouring cities such as Depok (1%), Bekasi (3%) and Tangerang (3%) and adjacent provinces such as West Java (7%), East Java and Bali (10%), Central Java (5%) and others (15%).

In terms of the political situation, Indonesia is a democratic country. It had a relatively successful transition from authoritarianism to democracy in 2004 with its first direct presidential election after the fall of Soeharto in 1998. Susilo Bambang Yudhoyono from the

Democratic Party, a secular nationalist political party, won the 2004 election and was re-elected in 2009 with more than 60% of votes. He will complete his second term administration in 2014. Prior to Susilo Bambang Yudhoyono's presidential term, Indonesia had five presidents: Soekarno (1945-1967), Soeharto (1967-1998), Bacharuddin Jusuf Habibie (1998-1999), Abdurrahman Wahid (1999-2001) and Megawati Soekarnoputri (2001-2004). The main political parties are nationalist and Islamic. Experience shows Indonesians prefer the nationalists-based party.

### *3.2.2. Economic Context*

Excluding 2009, Indonesia experienced economic growth during the 2004-2012 periods. Gross domestic product (GDP) exceeded 5.0%, however from 2013 economic growth has slowed. The World Bank reported in 2013 and during the first quarter of 2014, Indonesian GDP was 5.62 and 5.21 respectively. Table 3.2 shows the GDP growth rate from 2004 to 2012.

Table 3.2 GDP Growth Rate

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|---|---|---|---|
| Population, Total (million) | 221.3 | 224.5 | 227.7 | 231.0 | 234.2 | 237.5 | 240.7 | 243.8 | 246.9 |
| GDP (US$ billion) | 256.9 | 285.9 | 364.6 | 432.2 | 510.2 | 539.6 | 709.2 | 846.3 | 878.0 |
| GDP growth (annual %) | 5.0 | 5.7 | 5.5 | 6.3 | 6.0 | 4.6 | 6.2 | 6.5 | 6.2 |

**Source: The World Bank (2014)**

However, in terms of country development indicators published by the World Bank, Indonesia is described as the largest country in Southeast Asia with a nominal GDP and population exceeding other ASEAN (Southeast Asian Nations) members (see Figure 3.8). Figure 3.8 describes Indonesia is the most populous country in the ASEAN region and with GDP at US$878 billion and a population of 246 million people, it attracts investors. MarketLine (2013) reports that a US food processing company (Cargill) has been investing in

Indonesia since 2013 and several other major American companies including General Motors, American President Lines, and General Atlantic have been considering similar investment.

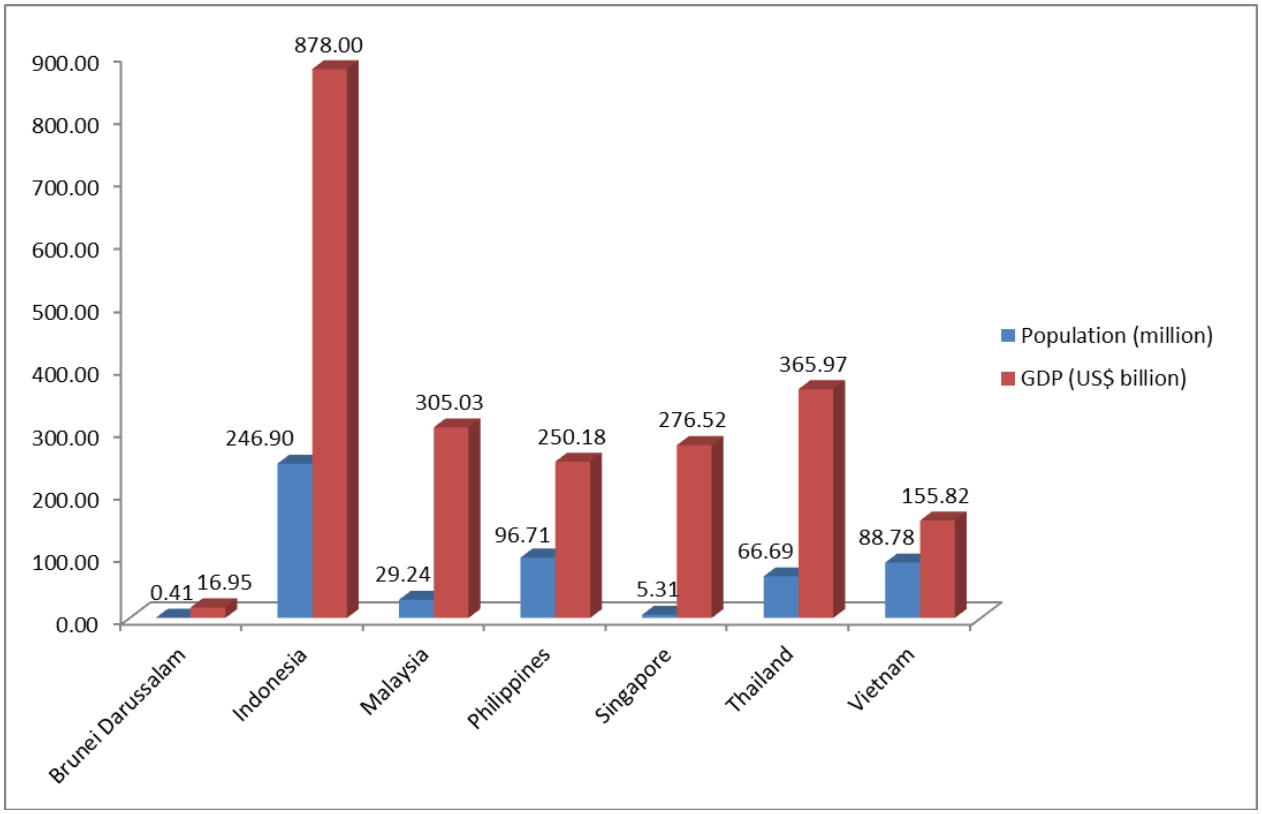


**Figure 3.8 - Comparison of GDP and Population in 2012 - ASEAN, Source: The World Bank**

However, since 2014 there has been growth in unemployment. According to the World Bank, Indonesia's unemployment rate is 6.17% and this problem has serious social stability implications particularly as 44% of the population is under 25 years of age, Unemployment or underemployment, could result in an increase in crime, ethnic and religious violence and terrorist attacks. It is believed that low education attainment is the main reason for the high unemployment rate. Euromonitor (2014) records that in 2012, 8% of the total population aged above 15 had attained higher education level. In the first quarter of 2013, Indonesian labour force participation rate was 68% and one-third of that percentage was women. Other challenges for the Indonesian business environment are an inefficient bureaucracy and corruption.

During 2008-2012, there was a slight increase in the number of listed companies (see Table 3.3).

Table 3.3 Number of Indonesia Listed Companies

| **Year** | **Number of Listed Companies** |
|---|---|
| 2008 | 396 |
| 2009 | 398 |
| 2010 | 420 |
| 2011 | 440 |
| 2012 | 459 |

**Source: The World Bank (2014)**

In 2012, in terms of stock market capitalization among ASEAN members, Malaysia was in the lead and Indonesia was in third position between Singapore and Thailand (Figure 3.9). In 2014, the World Bank reported, as of 2012 the number of Indonesian listed companies was 459 less than Malaysia and Singapore and Thailand had 921, 472 and 502 companies respectively.

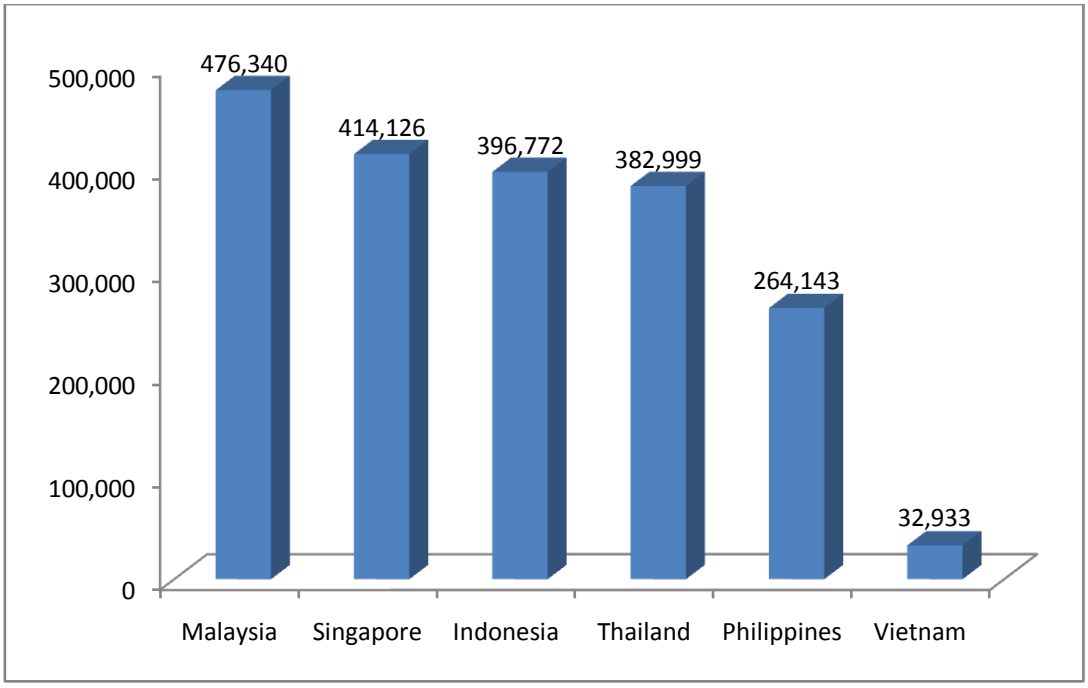


**Figure 3.9 - ASEAN Stock Market Capitalization 2012 (in US$ millions), Source: The World Bank (2014)**

In terms of percentage of GDP, in comparison with other ASEAN members, stock market capitalization of Indonesia ranked lower than Malaysia, Singapore, the Philippines and Thailand (Figure 3.10). Figure 3.10 shows Indonesia's stock market needs to be improved since the percentage achieved was 45.3% in comparison with Malaysia (156.2%), Singapore (144.3%), Philippines (105.6%) and Thailand (104.7%).

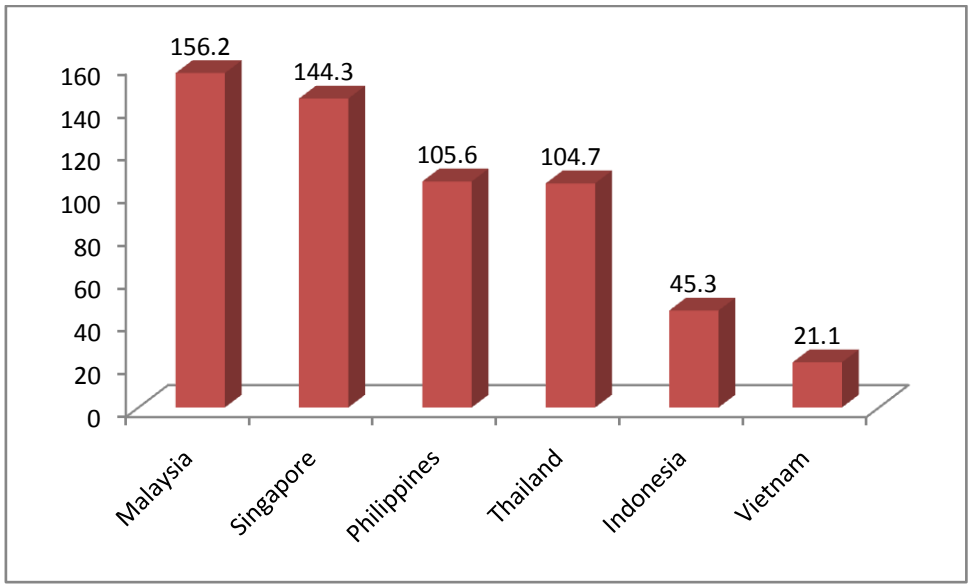


**Figure 3.10 - ASEAN Stock Market Capitalization as Percentage of GDP 2012, Source: The World Bank (2014)**

Bureaucratic inefficiency creates obstacles for investors in Indonesia. The World Bank (2014) stated that Indonesia has longer wait-time and the most compliance procedures to complete prior to setting up a business amongst ASEAN countries. Wait time amounts to around 48 days and includes compliance with 10 procedures. As reported by the World Bank (2013) the number of procedures that needs to be complied with to start a business in Indonesia are considered onerous in comparison with Singapore (2.5 days and 3 procedures), Malaysia (6 days and 3 procedures) and Thailand (27.5 days and 4 procedures).

According to a World Bank estimation corruption is widespread in both public and private sector and increases the cost of doing business by 20% (2014b). The current president has attempted to reform the business environment and an example, is the Government regulation that requires Indonesian importers to pay import duties and taxes at one of 45 appointed banks. However, reform has been slow as indicated by Transparency International's survey of perceived corruption that ranked Indonesia at 100$^{th}$ out of 183 countries in 2011. It was also reported that on a scale of 0-10, where 0 is the most and 10 as the least corrupt country, Indonesia's score was 3.0 (2014b). Through being informed about the economic conditions and business environment in Indonesia, the role of the auditor is important in both the public and private sectors especially to ensure companies comply with Government regulation.

### *3.2.3. Information, Communication and Technology (ICT) in Indonesia*

This section describes ICT penetration in Indonesia. It is necessary to have a general understanding about ICT in Indonesia as the researcher expects its use will motivate the adoption and use of GAS. In terms of ICT penetration, Indonesia with a large population spread over scattered islands, is a challenging market. The Asian Century Institute (2014) reported that telecommunications, especially the mobile market is the largest industry sector

in ICT. However, it recorded the lowest penetration rate of broadband access. Government has been initiating strategies to improve the broadband penetration rate by investing $9.2 billion in order to achieve 30% penetration rate in 2014 (Euromonitor, 2013). As a result of low broadband penetration, individual Internet user rate in Indonesia was reported lowest amongst ASEAN members in 2012. Figure 3.11 shows that despite the large population, only 15.36% of the population are internet users caused by the low quality of telecommunication infrastructure.

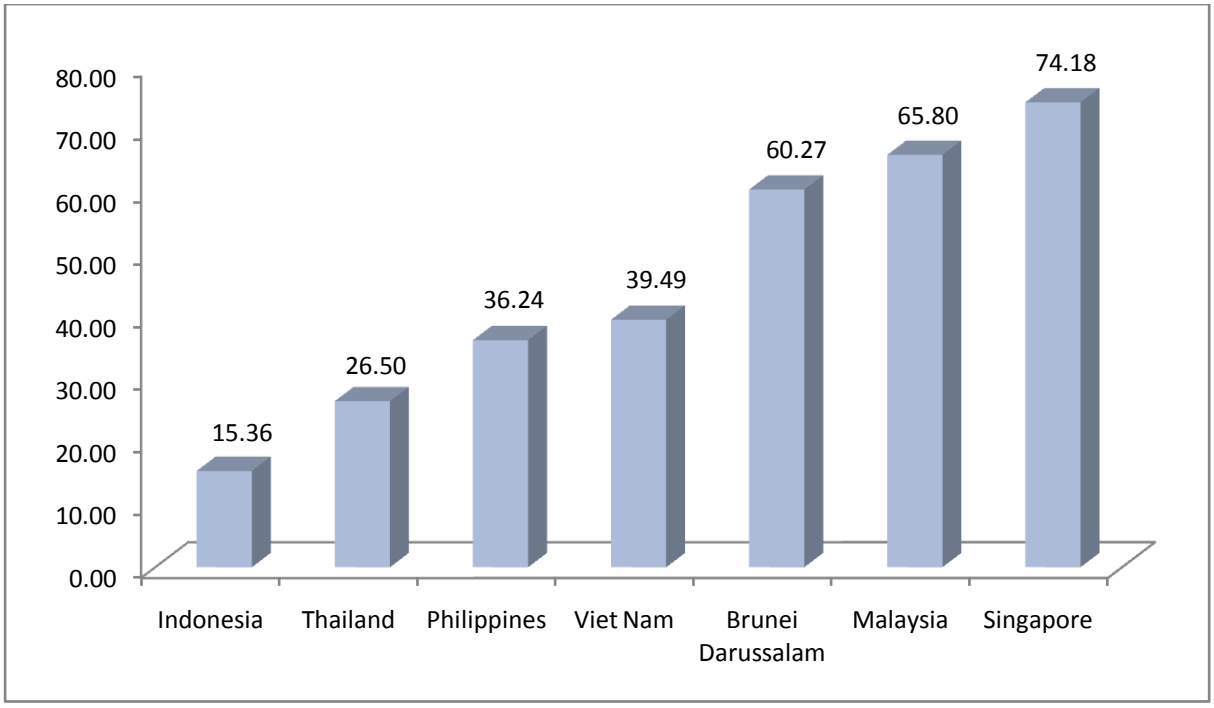


**Figure 3.11- The Percentage of Individuals using the internet in 2012 –**
**Source: International Telecommunication Union (2014)**

The use of technology in the private and public sector includes internet banking, Internet retailing and e-government. In 2001, a state-owned bank launched Internet banking, and although initial user numbers were low by 2013 there were approximately 1.79 million subscribers. Internet retailing started in Indonesia during 2006. The main retailer in this area was Gramedia, the leading book and media store followed by Bhinneka, the electronic retailer.

Euromonitor (2013) reported the total value of internet retailing reached US$8.3 billion during the period 2006-2011. Public institution use of technology was demonstrated with the adoption of e-government in 2003 across all Government institutions. The aim of e-government is to improve public transparency, public participation and innovation across government departments. An e-government survey in 2012, ranked Indonesia 97$^{th}$ position out of 190 participating countries. The Asian Century Institute in 2014 reported the ICT hardware market is the second largest industry in Indonesia. The following indications were reported during 2012-2013 and Table 3.4 indicates there was a slight growth in IT spending. Software sales are the lowest that was probably due to the prevalence of software piracy in Indonesia that was recorded as the worst in the world (MarketLine, 2013). Moreover, the awareness of particular business software remains low (GBG, 2013). Table 3.4 covers IT spending from individual, public and private sectors. The use of business software in public and private sectors, such as enterprise resource planning (ERP) software, accounting software or audit software, remains unclear. However, it is expected large or listed companies have been implementing ERP software due to their transaction complexities, and smaller companies have been using simple accounting software to record accounting transactions. In relation to the use of computerized systems by companies, it is expected audit firms will be motivated to enhance their technological support by investing in audit software. However, to date there is not any reliable information regarding the penetration of audit software in Indonesia.

Table 3.4 Indonesia's IT Spending 2012-2013

| **Sales** | **2012** | **2013** |
|---|---|---|

| | | |
|---|---|---|
| Computer hardware | US$ 4.2 billion | US$ 4.7 billion |
| Software | US$ 687 million | US$ 800 million |
| IT service | US$ 989 million | US$ 1.1 billion |

**Source: Asian Century Institute (2014)**

### 3.3 Indonesia's Professional Public Accountant Institutional Framework

As described in Purba (2012), the public accountant profession has been recognized since Indonesia was colonialized by the Dutch. At that time, bookkeepers or "*boekhouden*" (Dutch) were members of *Nederlands Instituut van Accountants* (NIVA) and outsourced from Holland. The firms were owned and operated by the Dutch and most were concentrated in cities on Java Island. Up until 1945, accountancy in Indonesia was known as bookkeeping and at the time, to become a bookkeeper, informal training was available known as "Bond A" and "Bond B". In the Netherlands, to be acknowledged as an "accountant", a university education was required.

Since Indonesian Independence in 1949, Dutch accountants have been able to teach accounting subjects in the Faculty of Economics of the University of Indonesia (FE-UI) at Jakarta. As a result, in 1957 Indonesian accountants graduated from FE-UI and at the same time, the *Use of Accountant Title No. 34 (1954)* Law was implemented. The law required that anyone who wanted to be an accountant needed to first study the subject at a public university school of accounting. Once the law was implemented, accounting firms run by unqualified staff were closed. By implementing the law, Indonesia protected companies from unlicensed accounting firms that operated widely in the 1950's. This law is still in operation today. Although accountancy and auditing in Indonesia originated with the Dutch, the generally

accepted accounting principles (GAAP) and auditing standards (GAAS) has been influenced by the US.

With the changing business environment in Indonesia and the need for a public accountancy profession, in 1997 Ministry of Finance (MoF) issued further regulations known as a *Decree of Public Accountant Service No. 43/KMK.017/1997*. A Further regulation was issued in 2008, the *Decree of Public Accountant Service No. 17/PMK.01/2008*, and this law still applies. The decree provides the basis for establishing, operating, and sanctions for the public accountancy profession and mandates the rotation of audit firms every 6 years and audit partner rotation every 3 years.

The accountancy profession has been supported by law as the public accountant's role is significant to the Indonesian business environment. For example, according to the *Indonesian Company Law No. 40 (2007)*, business entities are required to prepare annual financial statements in accordance with the accounting standards issued by the professional accounting body acknowledged by the Indonesian government. According to this Law, financial statements consist of a balance sheet, an income statement, a statement of cash flow, a statement of changes in stockholders' equity, and notes to the financial statements. The *Capital Market Law No. 8 (1995)* article 86(1) requires listed companies to publish periodic reports and submit such reports to the Financial Service Authority (OJK). The annual financial statements of listed companies should be audited in accordance with established auditing standards and reported to OJK within 90 days of the calendar year-end. Half-yearly financial statements must also be reported to OJK within 30, 60 or 90 days if unaudited, reviewed or audited. According to OJK rule No. X.K.2, listed companies are required to publish their financial statements in at least two Indonesian newspapers, one of which with

nation-wide circulation, within 90 days of the balance sheet date. The half-yearly financial statements are required to be published in at least one nationally circulated newspaper.

The Stock Exchange of Indonesia provides Rule No. I-E issued in 2004, requires similar reports from listed companies and publishes the complete financial statements of listed companies on its website. According to *Bank Indonesia Regulation No. 14/14/PBI/2012*, the transparency and publication of a bank's financial statements, semi-annual and annual financial statements must be audited and publicly disclosed within 60 days and four months, respectively, after the end of accounting period. Banks must also submit their audited financial statements to Bank Indonesia, Customer Protection Agency, rating agencies, Indonesian Banking Development Institute, two economic and finance research institutes and two economic and finance magazines, no later than five months after the end of the financial year.

In summary, *Company Law No. 40, 2007*, The *Capital Market Law No. 8 (1995)* and *Banking Law No. 6 (2009)* stipulate requirements for financial audits. For example, the Company Law stipulates business entities that fall into the following category are required to have their financial statements audited: (1) company collects and/or manages the community's fund; (b) Company issues a debt acknowledgement letter to the public; (c) Company constitutes an issuer; (d) Company constitutes a state-owned company; (e) Company owns assets and/or business with the minimum value of IDR 50 billion; or (f) Company is obliged pursuant to the prevailing regulation. All listed companies, non-bank financial institutions, and banks are required to be audited by a certified public accountant (CPA).

## 3.4 The Certified Public Accountant (CPA) Profession in Indonesia

### *3.4.1. President Soekarno Administration (Old Era)*

Between 1946-1958 following the Dutch practice *registeraccountant,* accountants were registered by the Indonesian government. The registration was categorised as the A, B, C and D register. The A register was Indonesian accountants who owned and operated an accounting firm. The B register was for foreign accountants who have a valid certification as a public accountant.

The C register was provided for foreign accountants who have a valid certification but worked as internal accountants in companies. Newly-graduated accountants were entitled to D register (Tuanakotta, 2007). To date, most accountants are registered in the D register (Perera and Baydoun, 2007)

The Institute of Indonesian Accountants (IAI) was established on December, 23 1957. The first committee consisted of the Chair of IAI, registrar, treasurer and commissioners. The committee prepared the charter of organisation that in February 1959 was approved by the Indonesian Ministry of Justice. Within ten years later, there were twelve accounting firms all of which were located in Jakarta and Bandung in Java.

### *3.4.2. President Soeharto Administration (New Era)*

During this era, Soeharto re-established the relationship with foreign countries and donor agencies that was cut during the Soekarno administration. The capital market was re-constructed and foreign accountants came to Indonesia. In November 1967, the Finance Minister, Frans Seda, permitted two local accounting firms to affiliate with foreign firms. Santoso Harsokusumo affiliated with Arthur Young from the US and Utomo Josodirdjo

affiliated with SyCip, Gorres, Velayo (SGV) & Co from the Philippines. However, in practice, the affiliation created problems such as lack of equality between accountants in terms of work load and the education and training process was unsound. In an attempt to guarantee that affiliation provided benefits for local firms, permission to affiliate was withdrawn by the new Finance Minister, Prof. Dr. Ali Wardhana. Furthermore, he issued decree No. 76 (1971) in February 1971. In article 2, it was stated that affiliation should provide benefits for both parties. For example, foreign accountants would be permitted to conduct an audit in Indonesia on the condition that Indonesian registered accountants were allowed to do so as well. In April 7, 1977 IAI established the Public Accountant Section (IAI-SAP) that designed the accountant development program.

As a result of business development, foreign investment increased and attracted foreign accountants to Indonesia. The following table describes the affiliation between local and foreign accounting firms from 1970 until the 1990's.

Table 3.5 Affiliated Accounting Firms during 1970-1990's

| Year | Accounting Firms |
|---|---|
| 1971 | Go Tie Siem with Turquand Young |
| 1974 | Go Tie Siem with Klijnveld, Kraijenhof & Co |
| 1971 | Tan Eng Oen with Price Waterhouse |
| 1972-1977 | Sudomo & Co with Peat Marwick Mitchell & Co |
| 1977-1987 | Soedjendro & Co with Peat Marwick Mitchell & Co |
| 1971-1979 | Suparman with Coopers & Lybrand |
| Dec 1980–Oct 1987 | Doli Lelo Pamintori Siregar & Co with Coopers & Lybrand |
| 1975-1991 | Hendra Darmawan & Co with Touche Ross International |
| 1985-1987 | Hanadi Raharja & Co with Klynveld Main Goerdeler |
| 1988-1990 | Hans Kartikahadi & Co with Deloitte Haskins & Sells |

**Source: Tuanakotta (2007, p326)**

The merger of large international accounting firms occurred during the Soeharto administration. The following firms merged: (1) in 1987 Peat Marwick Mitchell & Co merged with Klynveld Main Goerdeler and changed their name to KPMG; (2) in 1989 Arthur Young merged with Ernst & Whinney (E&Y); (3) in 1989 Deloitte Haskins & Sells merged with Touche Ross (Deloitte Touche Tohmatsu); (4) in 1998 Price Waterhouse merged with Coopers & Lybrand (PriceWaterhouseCoopers). These mergers influenced the composition of audit firms in Indonesia, Arthur Andersen affiliated with Utomo Mulia & Co (Prasetio Utomo in the latter), PriceWaterhouseCoopers affiliated with Hadi Sutanto & Co, Deloitte Touche Tohmatsu affiliated with Hans Tuanakotta & Mustofa, Ernst & Young affiliated with Santoso Harsokusumo (with Sarwoko Sandjaja & partner in the latter), KPMG affiliated with Sidharta Sidharta & Harsono. With the fall of Arthur Andersen, Prasetio Utomo & Co merged with Sarwoko & Sandjaja (affiliated with Ernst & Young).

### *3.4.3. Post Soeharto Administration (Reform Era)*

Since the Soeharto administration (1998 – 2004), B.J. Habibie led Indonesia (May 1998-Oct 1999), followed by Abdurrachman Wahid (Oct 1999-July 2001), Megawati Soekarnoputri (July 2001-Oct 2004) and Susilo Bambang Yudhoyono (Oct 2004-Oct 2014). Direct presidential elections were held in 2004 and the two challenges facing this current period of reform are to re-establish economic conditions post the financial crisis of 1998 and eradicate the corruption inherited from the Soeharto presidency.

Based on data from the PPAJP website, there are currently 383 active audit firms in Indonesia and 197 (51%) of them are partnerships and 186 (49%) are sole practitioners. For eligibility to conduct an audit in a capital market and bank environment in Indonesia, a public accountant must be registered as an auditor with OJK. One of OJK's functions is to monitor

and supervise financial services, including banks. On 31 December 2013, OJK took over this function from Bank Indonesia (BI), and henceforth all duties in banking regulation and supervision are its responsibilities. Figure 6 describes the number of audit firms that are registered with OJK in comparison with the total number of active audit firms. Figure 3.12 shows that 148 (75%) of the 197 partnership firms and 89 (48%) of the 186 sole practitioners are eligible to conduct an audit in banking industry. Overall, from the total firms in 2014, which is 383, 237 firms (62%) are eligible to conduct a banking industry audit. Since the number of sole practitioners is relatively high, regulators such as the Ministry of Finance need to pay more attention and give assistance to sole practitioners for the purpose of developing their capability to meet the needs of the business environment. As recommended by the World Bank in 2010, an accounting firm should have more than one audit partner to implement IFAC-prescribed quality assurance requirements.

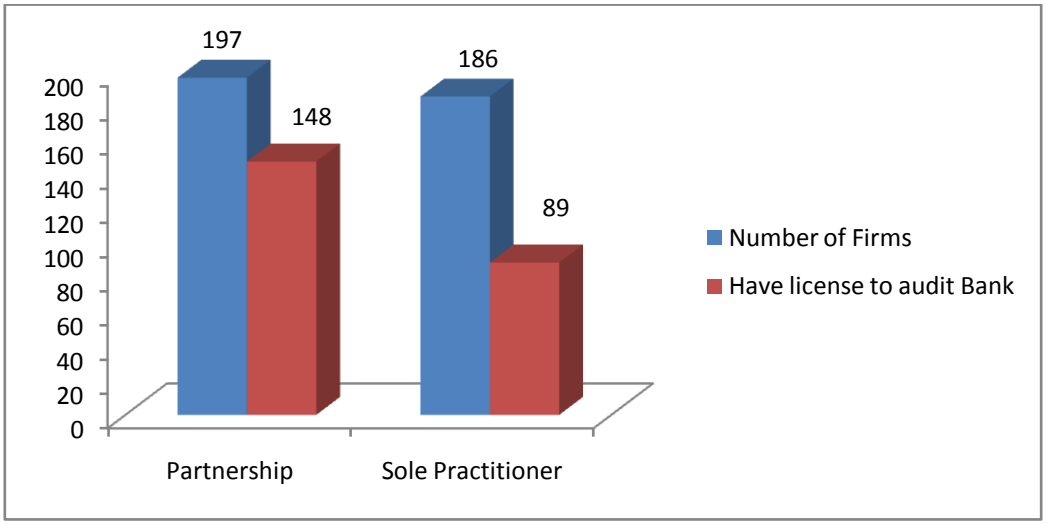


**Figure 3.12 - Number of Audit Firms in 2014, Source: PPAJP and OJK Websites (2014)**

Figure 3.13 indicates there is nothing to be concerned about except for the age of public accountants. In July 2007, more than 90% of the public accountants in Indonesia were above 40 years old (Tuanakotta, 2007) and the following graph describes the distribution of age in the profession. Figure 3.13 shows that the highest percentage of public accountants are in the

61-70 (31.5%) age group, followed by 51-60 and 41-50 amounting to 28.7% and 24.9% respectively.

The scarcity of young public accountants is believed to be a result of entry barriers. For example, a decree from the *Ministry of Finance No. 25/PMK.01/2014* (articles 2, 3 and 4) issued in February 2014, and states that a Bachelor Degree in Accounting that usually takes between 3.5 to 4 years is a prerequisite for registration. After completion of the degree, Professional Education for Accounting (PPAk) must be undertaken. This program takes 4 semesters or 2 years to obtain a registration number after which it is necessary to pass a certified public accountant (CPA) examination to obtain a CPA title. It can be seen that time and substantial financial implications are required to enter the accounting profession. Moreover, not all auditors in Indonesia are public accountants therefore it is not necessary to take the PPAk or CPA examination and be registered as a public accountant to work as an auditor. However, according to the *Law of Public Accountant No. 5/2011* (Article 13), sole practitioner audit firms should be established and managed by a public accountant. Likewise, public accountants should establish and manage partnership of which 2/3 of all partners should be qualified. In the case of a non-public accountant partner, prior to be appointed as a partner, Article 14 states that he/she should register him/herself with the Ministry of Finance and have at least five years working experience in the public accountancy.

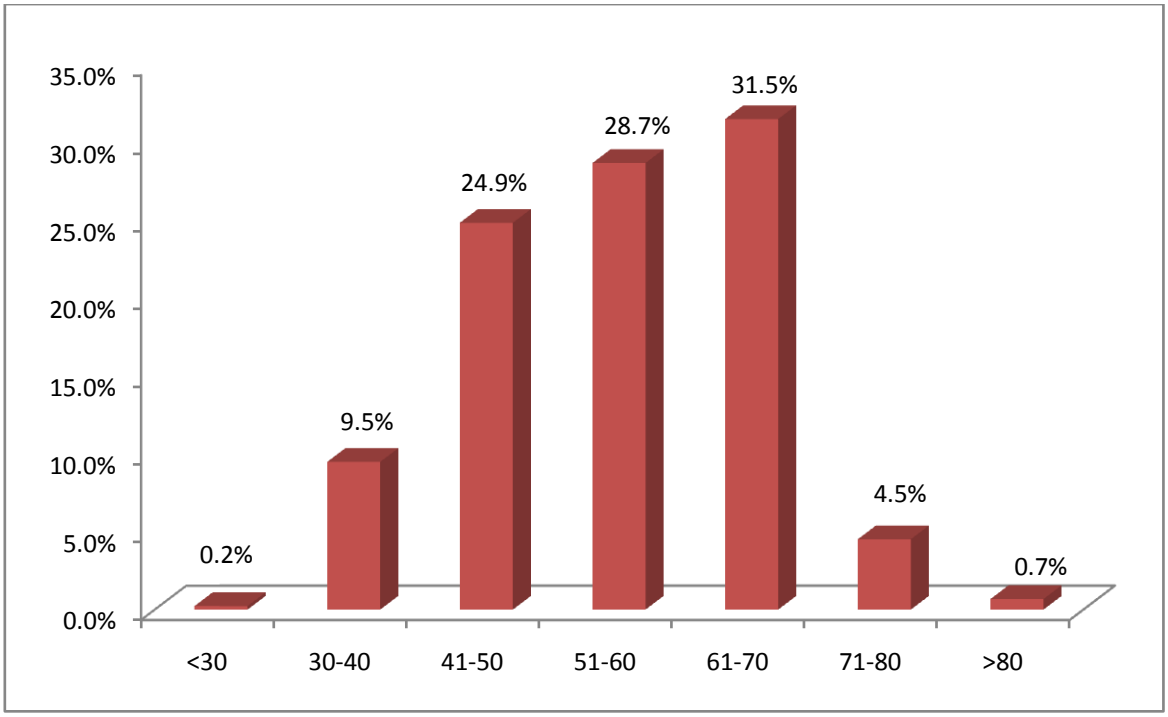


**Figure 3.13 - Age of Public Accountant, July 2007, Source: Tuanakotta 2007**

In 2006, Tuanakotta (2007) reported audit activities were dominated by non-Big 4 firms and of the 339 listed companies, 187 (55%) were audited by non-Big four firms. Ernst and Young audited 67 companies (20%), which was the highest number of audits conducted by a Big Four firm. PwC, KPMG and Deloitte Touche Tohmatsu recorded 7%, 2% and 12% respectively (see Figure 3.14). Overall, the Big four audited 41% listed companies. However in 2011, it was reported by Akuntan Online, that the Big four and the non-Big four audited 15.17% and 84.83% companies respectively. The data did not specify, whether it was only listed companies or included non-listed companies in Indonesia and did not breakdown the Big four into a specific firm.

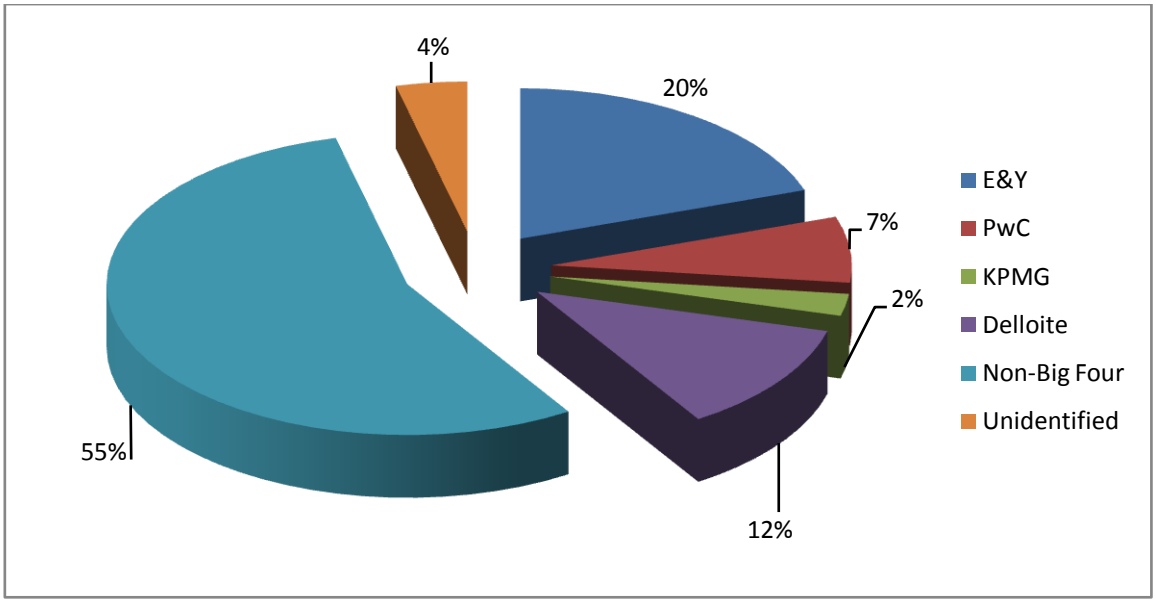


**Figure 3.14 - Listed Companies' Auditor in 2006, Source: Tuanakotta 2007**

Between the Big four and non-Big four firms, it was reported the former earned approximately 65% more revenue than the latter in 2010 and 2011 (see Table 3.6)

Table 3.6 Audit Firm's Revenue in 2010 and 2011

| Firm Size | Revenue (in IDR billion) | | | |
|---|---|---|---|---|
| | 2010 | % | 2011 | % |
| The Big four | 1,400 | 64.72% | 1,506 | 65.50% |
| Non-Big four | 763 | 35.28% | 793 | 34.50% |
| | 2,163 | | 2,299 | |

**Source: Akuntan Online 2013**

## 3.5 Indonesian Financial Accounting Standards (PSAK) and its Convergence to International Financial Reporting Standards (IFRS)

As cited from PSAK (2007), The Indonesian Financial Accounting Standards Board established the first Indonesian accounting standards in 1973 under the appointment of IAI as the accounting standard setter. The standards were referred to as Indonesian Accounting

Principles (PAI), and were adapted from the "Inventory of Generally Accepted Accounting Principles for Business Enterprises" published by the American Institute of Certified Public Accountant (AICPA). In 1984, the PAI 1973 was revised to reflect business development and the new standards were codified and published as The Indonesian Accounting Principles 1984 (PAI 1984).

In 1 October 1994, another significant revision of PAI 1984 occurred and was codified in The Indonesian Financial Accounting Standards 1994 (SAK 1994). In the same year, IAI decided to integrate the Indonesian accounting standards with the International Accounting Standards (IAS). During 1994-2007 updating occurred and new standards were included. The revisions of standards were held in October 1995, June 1996, June 1999, April 2002, October 2004 and September 2007.

In 2004, IAI announced that the IFRS would be fully adopted as Indonesian accounting standards. The Report on the Observance of Standards and Codes (ROSC) in 2005 indicated that as of 31 December 2004, the Indonesia Financial Accounting Standards Board (DSAK) had prescribed 59 accounting standards and 7 interpretations (WorldBank, 2005). As was mentioned previously, since 1994, Indonesian accounting standards have used the IAS. However, there were standards that were not IAS-based, such as the implementation of accounting for Syariah (Islamic religious law) banking, cooperatives, land, non-profit organisations, quasi-organisations, and joint operations. The reasons for this were that IAS was not seen as compatible with the business characteristics peculiar to Indonesia such as cooperative and that IAS did not have standards for Syariah banking.

As stated earlier, in 2004 IAI stated that IFRS would be adopted by 2008, however there was a delay to this outcome. It is important to note, the term 'adoption' referred to PSAK's compliance with IFRS in terms of substance and format, and would permit some modifications in recognition of the Indonesian business context. DSAK preferred to use the term of convergence to describe the process of IFRS adoption that was completed gradually. In 2006, IAI revised the adoption deadline to 2010. However in 2008, IAI delayed the adoption to 2012 (Maradona and Chand, 2014, Deloitte, 2009). The delay, as described in ROSC published by the World Bank in 2010, was due to the time the DSAK spent assessing the appropriateness of particular IFRS requirements to the Indonesian business context (WorldBank, 2011). Moreover, the need to translate all IFRS requirements into Bahasa also contributes to the postponement in adoption.

Although there was a delay in IFRS adoption, in 2009 DSAK expedited the process of IFRS convergence. In 2010, ROSC reported that by 31 March 2010, DSAK had reduced the gap between PSAK and IFRS. The gaps regarding IFRS were as follows: "21 PSAK were fully comparable; 5 PSAK were substantially comparable; 8 PSAK were substantially non-comparable; 4 IFRS had not yet been adopted" (WorldBank, 2011). The standards that were not comparable with IFRS were mostly due to the standards not having the IFRS counterparts such as, accounting for cooperatives. The following tables list the IFRS that have not yet been adopted (Table 3.7) and the list of PSAK that are substantially comparable with IFRS (Table 3.8).

Table 3.7 List of IFRS that had not been adopted yet

| No. | IFRS | Topic |
|---|---|---|
| 1 | IFRS 1 | First-time adopted of International Financial Reporting Standards |
| 2 | IAS 20 | Accounting for Government Grants and Disclosure of Government Assistance |
| 3 | IAS 29 | Financial Reporting in Hyperinflationary Economics |
| 4 | IAS 41 | Agriculture |

**Source: The World Bank 2010 (page 21)**

IAS 20 and IAS 29 adopted by PSAK 61 and PSAK 63 in 2011.

Table 3.8 List of PSAKs were substantially non-comparable to IFRS

| No. | PSAK | Year | Topic |
|---|---|---|---|
| 1 | PSAK 3 | 1994 | Interim Financial Statements |
| 2 | PSAK 18 | 1994 | Accounting for Pension Fund |
| 3 | PSAK 50 | 2006 | Financial Instrument: Presentation and Disclosure |
| 4 | PSAK 53 | 1998 | Accounting for Share-Based Compensation |
| 5 | PSAK 36 | 1996 | Accounting for Life Insurance |
| 6 | PSAK 28 | 1996 | Accounting for Casualty Insurance |
| 7 | PSAK 29 | 1994 | Accounting for Oil and Gas |
| 8 | PSAK 33 | 1994 | Accounting for General Mining |

**Source: The World Bank 2010 (page 21)**

At the end of 2010, PSAK 3, PSAK 18, PSAK 50, PSAK 53 had been adopted to each relevant IFRS as issued by IASB (International Accounting Standards Board) at 1 January 2009. In January 2013 there were only IFRS 1 (Firs-time adopted of IFRS) and IAS 41 (Agriculture) that had not been adopted. IFRS as issued by IASB at 1 January 2009 have

been adopted. A report released by PwC (2013) explained that IFRS 1 will not be adopted due to lack of equivalent standards in PSAK that have been considered or included in the transitional provision in the individual standards/interpretations. It is possible that IAS 41 does not have equivalent standards in PSAK, hence its implementation has been deferred until IASB makes an amendment. PwC (2013) stated that:

> "The IAS 41 model is not currently considered to be compatible with the agricultural activities in Indonesia, most of which are bearer biological assets. Unlike IAS 41 that requires the agriculture to be measured at fair value, the accounting for agriculture under PSAK is still based on historical costs"

In Indonesia, IFRS were not required for use by domestically listed companies until 2012 (Borker, 2013), however IFRS in Indonesia was intended to be implemented for listed companies, State-Owned Enterprise (SOE), large financial institutions or companies with significant public accountability. Due to IFRS complexities, in July 2009 DSAK established accounting standards for Small to Medium Enterprise (SME) and non-listed companies. This is known as Financial Accounting Standards for Non-Publicly Accountable Entities (SAK-ETAP) to protect SMEs and non-listed companies from IFRS complexities and to ensure they provide high quality financial reports. SAK-ETAP was implemented in 1 January 2011 and with the publication of SAK-ETAP, Indonesia has now multi accounting systems that are IFRS-based accounting standards, SAK-ETAP and Syariah accounting standards. Syariah accounting standards is implemented for Islamic banking and the principles of IFRS-based accounting standards do not apply to this context. For example, Islamic values encourage interest-free banking, whereas in conventional banking interest is applied as a matter of course.

The IFRS convergence presents challenges for Indonesian auditors due to the need to detect financial misstatement of IFRS-based companies. To date there has not been any empirical

research about the effectiveness of IFRS implementation in Indonesia. Most of existing IFRS-related studies in the Indonesia context focus on the process of adoption or convergence. For example, Perera and Baydoun (2007) investigated reasons that may inhibit IFRS convergence, such as the legal environment, cultural and religious factors. Borker (2013) assessed the cultural profile in a group of Global Growth Generator countries, such as Indonesia, Mongolia, Bangladesh, China, Egypt, Vietnam, India, Iraq and Srilanka in terms of readiness for IFRS convergence. For example, it indicated Indonesia tended to follow statutory controls in terms of accounting practice, and complied with legal requirements and legislative controls rather than professional judgment. Lasmin (2011) found business and regulators were reluctant to increase transparency and comparability of financial reporting practices thus contributing to low level IFRS integration. Maradona and Chand (2014) investigated challenges in IFRS implementation in Indonesia and they raised several issues that included the complexity of standards, professional judgement as a consequence of a principles-based approach, IFRS-related training, education programs and the gap between local standards and IFRS. Despite the positive perceptions of Indonesian accounting professionals, Wahyuni (2011) stated that the language barrier and insufficient training were issues that needed to be resolved for IFRS implementation. In terms of external auditor readiness, Shonhadji (2012) suggested that auditors can acquire the necessary knowledge of IFRS by attending trainings and/or seminars. It is furthermore important for auditors to be exposed to IFRS-based companies and thereby increase their experience by auditing such companies.

### 3.6 Auditing Standards

In May 2007, the Indonesian Institute of Certified Public Accountant (IAPI) was established to represent the auditing profession. Before its establishment, IAPI was part of IAI under the

Department of Public Accountancy. In February 2008, IAPI was acknowledged as the professional public accountancy organisation by a regulation of the Ministry of Finance. Through obtaining this acknowledgement, IAPI has been responsible for establishing a code of ethics as well as auditing standards. For example, IAPI prepared a Code of Ethics in October 2008 based on the IFAC Code of Ethics for Professional Accountants and was issued in January 2010.

Auditors are required to comply with Indonesian Public Accountant Professional Standards (SPAP) set by the Audit Standards Committee (DSP) of IAPI. SPAP was developed based on the US Statements of Auditing Standards (GAAS). In 2010, the World Bank reported it was a significant initiative by IAPI to move from SPAP to the International Standards on Auditing (ISA). The initiative was based on the recommendation of the World Bank in 2005, to ensure compliance with IFAC, to comply with G20 requirements and to implement the mandate of the *Law of Public Accountant No. 5/2011*. Following the 2005 ROSC published by the World Bank, Indonesia would comply with ISA. Although IAI intended to implement ISA in 2007, it was delayed until 2009. In October 2009, the implementation was deferred until 2013.

Although ISA is mainly converged to SPAP, there are some differences between the two. Tuanakotta (2013) explained the differences between ISA and SPAP. The first difference is the audit approach. ISA encourages a risk-based audit approach, whereas SPAP uses a transaction cycle-based approach. The risk-based approach tends to organise client information based around business activities, whereas the transaction cycle-based approach arranges it based on account classification. The second difference is similar with IFRS. ISA focuses on a principles-based approach rather than a rule-based approach. The changes encourage professional judgement to be exercised from auditors and the ISA provides

specific criteria for this. For example, the audit process should indicate to the extent of involvement of an expert partner in an audit assignment (industry expertise and audit experience). Sari (2012) described differences between ISA and SPAP. For example, ISA does not divide the presentation of standards as SPAP categorise them, such as, General Standards, Field Work Standards and Reporting Standards. The ISA presentation reflects the process of auditing.

ISA was implemented in Indonesia on 1 January 2013 (Tuanakotta, 2013). However, according to Tuanakotta (2013), implementation date of ISA in Indonesian audit firms varies and occurred between 2000 and 2008. He surveyed the large and internationally affiliated firms and during which it was indicated the decision to adopt ISA was international affiliate firms' decision. ISA has been used to audit companies which have overseas-based parent companies. These companies use ISA for their audits, especially in Europe-based companies, whereas US-based companies usually use US GAAS. To date, the progress of ISA implementation in Indonesia remains unclear, irrespective of the fact it has been a benchmark for audit listed companies since 1 January 2013. Furthermore, there is not any empirical related research about ISA implementation in Indonesia, therefore, its progress, effectiveness and implications for the audit profession remains unquantifiable.

## 3.7 Challenges for Indonesian Certified Public Accountant (CPA) from the ASEAN Economic Community (AEC) 2015

In 2015, Indonesia will join the ASEAN Economic Community (AEC). The AEC was proposed by Prime Minister of Singapore, Goh Cok Thong and was agreed by all ASEAN members in November 2002 at the ASEAN Summit in Phnom Penh, Cambodia. One of the purposes of the AEC is to liberalize trade and services. This means financial services will

also be liberalized and public accountants from other ASEAN members will be able to operate in Indonesia. The challenge is that the number of public accountants in Indonesia is comparatively low compared to other ASEAN members. For example, in 2012, Indonesia had approximately 1000 public accountants while Malaysia had 2500, Philippines had 4941, and Thailand had 6000 (IAI, 2013). In 2014, according to the Malaysian Institute of Accountant's website, the number of Malaysian public accountants reached 7151 and data from the PPAJP's website states that Indonesia has only 1039 active accountants.

Another barrier is the quality and competency of public accountants. For example, Indonesian public accountants need to use English as the international language to communicate with their foreign colleagues. Even though there is not research that focuses on the impact of English fluency for public accountants to professionalism, it is important for them to acquire this skill. Unlike neighbouring countries such as Malaysia or Singapore; Indonesians speak Bahasa in formal and informal communication. The implementation of IFRS and ISA are two of the many challenges Indonesian auditors need to address. To date, the IAI and IAPI have been focusing on increasing accountants' professionalism through training modules about on IFRS, ISA, ethics and leadership. The training modules are considered insufficient since accountants need to improve their hard skill capabilities, such as English and audit technology literacy.

## 3.8 Conclusion

Indonesia, as a developing economy, faces social or cultural, economic and ICT challenges. In terms of social or cultural challenges, Indonesia needs to focus on preventing a separatist rebellion and ethnic and religious violence. Even though Indonesia recorded the highest GDP in the ASEAN region that attracts foreign investment, it needs to focus on improving the

business environment through streamlining the bureaucracy, improving the ICT infrastructure and eliminating corruption. Moreover, reforming the business environment will open the job market thereby reducing the unemployment rate.

Indonesia inherited audit practices and public accountancy from the Dutch Colony however, auditing was based on US standards. Indonesia has been developing institutional frameworks and a public accountancy profession since Independence in 1945. To date, there are six institutions that monitor and supervise accounting and auditing practice, that are IAI, IAPI, OJK, PPAJP, Bank of Indonesia (BI) and the Indonesia Stock Exchange (IDX). They monitor the process by issuing regulations to ensure financial stakeholders are safeguarded. For example, in terms of audit practice, OJK monitors the financial statements of listed companies. The IDX reviews listed companies' annual or quarterly financial statements, as well as the disclosure of information as required by OJK. BI has the authority to regulate and supervise the banking sector that includes ensuring banks comply with the appropriate financial reporting requirements. Auditors are also subject to a multi-layered supervision system. PPAJP conducts examinations or quality reviews to ensure compliance by auditors with auditing standards. IAPI also has a peer-review system in place for its member.

Indonesia needs to prepare its human resources capability to face the challenges of AEC in 2015. Currently, the quantity and quality of public accountants needs to be improved. In terms of quantity, regulators and the professional bodies need a comprehensive strategy to attract more people to the profession. Public accountants need to update their hard skills as well as soft skills with support from regulators and accounting professional bodies to overcome the issue of quality. In this way, Indonesia will be better prepared to compete with other ASEAN nations.

# CHAPTER 4 - RESEARCH METHOD

## 4.1 Introduction

The objectives of this chapter are to describe and justify the methods applied in the thesis. This study uses a qualitative approach consisting of semi-structured interviews. This approach was applied to obtain in-depth understanding about the adoption and use of GAS in Indonesian auditing firms and the factors influencing it. Given the nature of the research questions, it is important to explore the adoption and use of GAS through a sample of professional participants. Through using semi-structured interviews, comments elicited provide deeper insight into the process and issues than would have been possible using an alternative approach such as surveys.

The chapter begins with a description of the research assumptions that underpin the study. It includes a justification for the use of the qualitative and interpretive approach as a structure through which the researcher is able to analyse the data. The next section provides justification for sample selection and describes the criteria for participants and method of access. The development of the research instrument is discussed next and consists of a review of existing studies and relevant documentation as a basis for developing the interview guide. The process of translation of the interview guide from English to Bahasa is also discussed in this section.

The next section describes the research process that includes pilot testing and interviews. Data analysis and the coding process are discussed in the next section. Coding and analysis of interviews data are explained with a reference to the research questions. This chapter concludes with a summary.

## 4.2 Research Assumptions

This study uses a qualitative approach that enables researcher to investigate a particular subject in-depth. It is also suited to exploratory research, where the particular topic is relatively new and there is an absence of previously published research (Myers, 2009). This study is exploratory in nature because while others have studied CAATs or GAS, they have not focused on a developing economy such as Indonesia. While there have been some relevant studies in GAS use and adoption (see, for example, Ahmi and Kent, 2013; Bedard et al., 2003; Braun and Davis, 2003; Dowling, 2009; Dowing and Leech, 2007; Janvrin et al., 2008, 2009; O'Donnell and Schultz Jr, 2003), most of them have focused on developed countries, such as the US and the UK. Moreover, these studies have tended to use survey questionnaires that do not deliver an in-depth analysis of the decision to use GAS. The lack of interview-based studies about GAS use provided the current researcher an opportunity to contribute to the literature.

The use of GAS is relatively new in Indonesian audit practices and there is a need for more detailed information that includes experiences and perspectives about its adoption and application. Moreover, prior research is lacking from the perspective of its adoption and use in Indonesian audit firms that result in the process lacking clarity. An in-depth understanding of the process is needed to better appreciate the complexities within the Indonesia context.

The decision to use a different theoretical framework to previous studies and the inclusion of research participants from Indonesian audit firms of all sizes motivated the researcher to use a qualitative approach. Several previous studies adopted the Unified Theory of Acceptance and

Use of Technology (UTAUT) as its theoretical base. UTAUT was developed by Venkatesh et al. (2003) to describe the individual's acceptance of IT factors and to that end, the present study adopted the Technology, Organisation and Environment (TOE) framework as a theoretical base. TOE framework was chosen because it provides an explanation of IT acceptance by both organisations and individuals. This study assumes that the adoption and use of GAS is the firm's decision not that of the individual auditor as it necessitates a significant investment. This decision is likely to be costly and may impact materially on audit quality. Accordingly, this study is the first to examine use of GAS through the lens of the TOE framework.

Qualitative research enables the researcher to examine in-depth participants' experiences, opinions, emotions and perspectives regarding a specific research issue (Hennink et al., 2011). Moreover, qualitative research is used to provide better understanding of broader issues that quantitative studies cannot provide e.g. emotions (Eriksson and Kovalainen, 2008). Qualitative research does not capture numerical data and test hypotheses and/or theory. It captures the "words that have already been meaningfully pre-structured by a group of fellow human beings" (Myers, 2009). Qualitative research assesses the quality of things using words, images and descriptions and Berg and Lune (2012) urge researchers to interpret the words, images or descriptions with care. The definition and procedures needs to be accurately defined and described.

This study seeks information about auditors' perceptions and experiences of GAS use. It is essential to study the perception of the importance of GAS, because it may improve the quality of the audit. Interpretive research is used to understand the phenomenon that is being

used in the context of this study. An objective of interpretive researchers is to understand the context of phenomenon, since this defines the situation (Myers, 2009).

The interpretive approach seeks to understand the individual's experience from his/her perspective (Hennink et al., 2011). This approach involves studying subjective meanings that individual attach to their experiences and Myers (2009) describes five methodological characteristics as follows. Firstly, the interpretive researcher claims that the correct meaning of data is determined by the context (theory). In terms of this study, the TOE framework is used to interpret the findings from interviews. The TOE framework was discussed in Chapter 2.

The second characteristic assists researcher to understand the meanings and intentions of the individual studied. In this study, the TOE framework assists the researcher to understand the factors that come into play during the adoption phase of GAS in Indonesia. Specifically, the TOE framework identifies potential technological, organisational and environmental influences that are important aspects in the adoption and implementation of technology. As the adoption of technology is a significant business decision that is likely to be costly and impact materially on audit quality, it is important to understand the TOE aspects that drive firms to acquire GAS. This makes it possible to identify factors that drive the acquisition of software and the TOE framework enables investigation into barriers to its use. The third characteristic of interpretive research enables context-focused generalizations to be formulated about the findings and it is important to remember that those of this study are only valid in the context of audit practices in Indonesia.

Myers (2009) states the fourth characteristic assumes that meanings emerge and are context dependent and researcher attempt to elicit meaning. It is anticipated some factors could emerge that are important to the adoption of GAS and dependent on the specific context. For example, in the Indonesian audit environment, according to the anecdotal evidence most auditors are not highly trained in GAS and financial resources are limited.

The fifth characteristic accepts that facts may have already acquired specific meanings and values. Furthermore, interpretation may be predicated on theoretical insights and literature. In this study, interpretation is based on the TOE framework and previous literature (for example, Ahmi and Kent 2013; Bedard et al. 2003; Braun and Davis 2003; Dowling 2009; Janvrin et al. 2008) on GAS use. However, there is a possibility that interpretation is subjective and could be based on the researcher's personal opinions, assumptions and values. The unique characteristics that differentiate this study from others are the Indonesian focus, the qualitative approach, audit firm size and the underpinning theory.

## 4.3 Sample Selection and Study Period

As previously stated, this study uses the interview method to gather in-depth information from participants. The interviews structure assists researchers to obtain comprehensive data from participants (Myers, 2009). As stated in Chapter 3, based on data from the PPAJP website, in 2014, there are 383 active audit firms in Indonesia and 197 (51%) of them are partnerships and 186 (49%) are sole practitioners. The participants for interview were selected from a range of auditing firms of all sizes, a professional accounting body, The Financial Services Authority of Indonesia (OJK) and Centre for Supervision of Accountants & Appraiser Services (PPAJP). Twenty-seven external auditors from auditing firms, one member of the professional body, the Indonesian Institute of Certified Public Accountant

(IAPI), one staff member from OJK and five staff members from PPAJP were selected for interviews.

The first stage interviews were held between June and August 2012. The second stage interviews were held between July and August 2013. The interviewees were selected using the snowballing method. Noy (2008) recommends this method because the researcher can "accesses informants through contact information that is provided by other informants" . Faugier and Sargeant (1997) assert that the snowball approach provides advantages in acquiring information on difficult-to-observe phenomena that are sensitive, illegal or deviant. It also provides an efficient way of identifying research participants who may be difficult or impossible to locate or contact hence it is appropriate method for research that is explorative, qualitative and descriptive in nature.

The use of GAS is relatively new to audit practices in Indonesia and the researcher believes its use is a sensitive topic for most, especially middle and small sized firms. It is a sensitive subject in the context of IT capital budget allocation, the level of GAS use in audit firms and the level of auditors' IT skills. The researcher predicted that many audit firms would be reluctant to participate in this study or that they would not give accurate responses if trust had not been established beforehand. The snowballing approach assisted the researcher to gain the trust of possible participants who were referred in advance by high profile practitioners in the Indonesian auditing profession. For example, the researcher was introduced to potential participants by a known and respected contact.

Researchers need knowledge about the social context they wish to investigate and usually begin research by gathering information from a small set of contacts who trust them (Faugier

and Sargeant, 1997). Information of this kind was acquired for this study through the researcher making contact with potential participants from a list of auditing firms in Indonesia from the IAPI's website. The list contains the partner's name(s), the audit firm's address, phone numbers, email address and website (if any). Faugier and Sargeant (1997) advise making use of associated individuals or groups as informal research assistants to gain access to the research population. The researcher also contacted key individuals in the Indonesian auditing sector such as a member of the IAPI and academics. Through informal networking, the researcher was able to access potential participants through the acquisition of contact details of partners or senior staff from the Big four, middle and small size firms, regulators and a senior member of a professional accountancy body.

Once the connection with potential participants had been established, the researcher contacted them through mobile phone and/or email with an invitation to participate. In this initial contact, the researcher described the purpose of the study and the questions that would be asked in interviews. The researcher also requested the invitation be extended to staff responsible for maintaining and using generalized audit software (GAS) or computer assisted audit techniques (CAATs) if the contact was unable to provide the required information. Furthermore, the researcher invited the supervisor or IT staff to the interview that enabled eligibility verification of potential participants (Faugier and Sargeant, 1997). At the completion of interview, the researcher asked the participants to recommend other potential participants. If the potential participants refused to participate, the researcher asked for the reason and recorded the response.

## 4.4 Research Instrument

To develop a reliable and valid research instrument, previous studies and relevant reports were first reviewed. The interview guide was developed in English and translated into Bahasa (the national language of Indonesia). After translation, the interview guide was pilot-tested with a small number of external auditors and academics prior to the interview. Interviews were conducted in Bahasa, and the interview transcripts were translated from Bahasa to English.

### *4.4.1. Review Existing Literature and Documentation Relevant to the Indonesian Audit Market*

The first stage involved reviewing previous studies from journals, articles, conference documents, books and other materials of relevance to this study. Auditing standards, regulations, Government reports and other related documentation were examined to describe the current adoption of the technology adoption and use of GAS.

Literature from previous studies was sourced from relevant and appropriate scholarly journals. Indonesian auditing standards (SPAP) were reviewed to assess compliance with International Standard of Auditing (ISA) in terms of GAS use. This development is important as in 2013 ISA was adopted with customisation. The relevant Government regulations and reports from the Indonesia Financial Services Authority (OJK), Bank of Indonesia (BI) and Ministry of Finance were also reviewed to confirm Government's awareness of IT utilisation in audit firms and GAS use specifically. Moreover, reports specific to Indonesia from international funding agencies such as the World Bank, Asian Development Bank (ADB) were also reviewed. This study reviewed information from business newspapers and journals to analyse the current context for GAS adoption and use.

### *4.4.2. Development of an Interview Guide*

An interview guide is a list of questions used by the interviewer (Hennink et al., 2011). Since this study involved semi-structured interviews, the interview guide was less structured. In this study, the interview guide consists of the following structure: introduction, opening questions, key questions and closing questions. The interview guide can be found in Appendix 1**.**

During the introduction, the researcher asked demographic questions such as the participant's years of experience, their workplace position and educational attainment. These questions provided the researcher with contextual information about the participants, and assisted the process of building a connection with the interviewee (Hennink et al., 2011, Berg and Lune, 2012).

The opening questions were asked to develop a connection with the participants. It is important to establish prior connection with participants before the key questions are asked (Hennink et al., 2011, Berg and Lune, 2012)**.** These initial or introductory questions were associated with the key questions of this study that relate to the specific GAS programs participants used, the level of GAS use in their audit firms, and GAS related training they had received.

Key questions formed the central part of the interview guide and were designed to address the main research issues. These questions were based on the issues identified in prior studies about relevant technology adoption and use. Included were factors of potential influence and barriers to adoption and use based on the theoretical framework. The researcher encouraged

participants to answer the questions as accurately as possible. They were informed there were not any right or wrong answers and could speak freely about their perceptions and experiences in an anonymous setting. The closing questions were general questions. For example, the researcher asked participants about their plans for future GAS use and also, if they had any further comments to add. The researcher has included the closing questions in the interview guide.

### *4.4.3. Interview Guide Translation*

The interview guide for this research was translated from English to Bahasa by the researcher and pilot-tested prior to interview to ensure its accuracy and applicability (Prieto, 1992). The researcher was considered qualified to translate the interview guide. The combination of pre-testing and translation from source (English) to target language (Bahasa) without reverse translation is defined by Maneesriwongul and Dixon (2004) as forward translation with testing. They assert that forward translation can be done with only one bilingual translator. The current researcher used the above techniques due to limited resources (time, cost and staff).

However, other translation methods can be applied. For example, Brislin (1970) recommended the following translation techniques for cross-cultural studies: back-translation, bilingual techniques, committee approach and pre-testing. *Back-translation* technique includes the participation of two bilingual participants. The first bilingual participant translates from source to target language. The second bilingual participant verifies the translation by translating text back to the source language. *The Bilingual technique* translates from the source to target language and inconsistencies in translation are easily found. *The Committee approach technique* uses a bilingual group to translate the research

instrument from source to target language. *The Pre-test technique* is applied once translation has occurred and a pilot study is conducted to ensure all questions are well-formulated and assess participants' understanding and interpretation of the questions. The above translation techniques have been recommended particularly for cross-cultural studies in Psychology, however in the auditing context its application is untested.

## 4.5 Research Process

### *4.5.1. Pilot Testing*

Prior to interview, the researcher conducted pilot testing to ensure the interview guide was well-defined. The guide was assessed in terms of its capacity to facilitate an effective interview and deliver information needed (Berg and Lune, 2012). Moreover, pilot testing was important in assessing participants' understanding and interpretation of the questions included in the interview guide.

Pilot testing occurred on 4th June 2012 to 11th June 2012 and conducted in Bahasa. Two junior external auditors and two academics from two reputable universities in Jakarta were invited to participate. The external auditors came from the Big four and mid-sized audit firms. The academics were from the school of accounting in universities and had more than five years teaching experience in the auditing field. Based on the findings of pilot testing, the interview guide was revised. Pilot testing took place in the participants' offices and the duration for each session was fifty to ninety minutes.

The results of the pilot test demonstrated potential problems such as the wording and ambiguities interpretation. The following are examples of ambiguous questions: "to what

extent do you believe that your organisation's technical infrastructure supports effective use of GAS?" Participants believed the underlined words made the question ambiguous. Therefore the researcher reworded the question by asking participants to describe the IT infrastructure (hardware and software) that were provided by audit firms and how it assisted them improve the quality of the audit process. Another example was "how proficient are you with the use of technology in your job and in the use of GAS specifically?" This question was reworded by asking participants (1) to list software they were literate in and to rate their literacy (low moderate to highly literate), (2) the participants were asked if high technology literacy lead to increased GAS use. Sound research methodology requires careful consideration of wording because it influences the accuracy of the answers (Berg and Lune, 2012) and the questions need to reflect the context of the topic of study as well as that of participants (Hennink et al., 2011).

The participants raised the issue of question sequence and the researcher took their concerns seriously. Confusion about question sequencing could results in a decrease in the quality of the interview data (Hennink et al., 2011). Before pilot testing, question sequencing was based on the research questions (RQ). For example, RQ1 questions were positioned first. The participants in the pilot test found the order of questions confusing as some questions occurred without notice or were not in the appropriate sequence. Based on the findings, the interview guide was structured as follows: introduction, opening questions, key questions and closing questions.

### *4.5.2. Interview*

The interviews were in-depth, semi-structured and included open-ended questions to elicit views and opinions from participants related to adoption and use of GAS. Ethics approval

was obtained before interviews were conducted. Approval was forthcoming from the Chair of the Business College Human Ethics Advisory Network RMIT University (approval number: 1000377) before the researcher conducted the data collection process in Indonesia. Ethical considerations were given priority in this study.

With regard to contacting potential participants, the researcher provided information about the study for their consideration. It was emphasized that participation was on a voluntary basis. After the participation agreement was signed, the researcher made an appointment for interview. Prior to interview, the researcher completed the following actions:

1. The researcher assured the participants their identity would remain confidential. Only the researcher and her supervisors could access their data. Any reports and/or publication of this study would not reveal the participants' identity and personal information.
2. The researcher stated that participation in this study was voluntary and the participants were not coerced to take part in this study.
3. The researcher advised participants they were free to withdraw their participation at any time.
4. The researcher assured the participants their cultural and religious background would be respected and information would not be sought about their cultural background and/or religious beliefs.
5. The participants were asked to sign a Participant's Consent form (Appendix 4)

The interviews took between fifty to ninety minutes, were held in the participants' office and audio recorded with the interviewees' permission. The interview transcripts were

subsequently sent to participants for validation and clarification. It was agreed by participants that of twenty-six transcripts, twenty-two needed minor revision.

As was mentioned in the Sample Selection and Study Period section, the participants were sourced through the snowballing approach. The interviews were conducted between the 12th June and the 28th August 2012. The follow-up interviews were conducted between the 16th July and the 16th August 2013. Follow-up interviews were needed to confirm the results of the first stage interviews. The interview results from previous data collection needed to be clarified with the respondents due to the presence of some unclear answers and to ensure the researcher interpreted their opinion accurately. For example, it was necessary to obtain more accurate responses about the use of GAS and the context of its use. It was also important to be specific about the linkage between the use of GAS and relevant audit procedures. Moreover, participants from OJK and PPAJP needed to be included in this process because previous findings identified diverse opinions among audit firm participants regarding the role of regulators in encouraging GAS adoption and use. Staff from OJK and PPAJP had not been identified as potential research participants hence they were not interviewed. The follow-up interviews ascertained the extent regulators or professional body support increases the use of GAS in audit practices and whether such are factors in the decision to use it.

Once agreement to participate was reached, the researcher made an appointment to meet the participants. The participants for interviews were as follow:

| **First Stage Interview (the 12th June and the 28th August 2012)** | **Follow-up Interview (the 16th July and the 16th August 2013** |
|---|---|
| • Twenty-seven external auditors from auditing firms. | • All participants from First stage Interview. |

| | |
|---|---|
| • One member of the professional body the Indonesian Institute of Certified Public Accountant (IAPI). | • One staff member from the Indonesia Financial Services Authority (OJK)<br>• Five staff from the Centre for Supervision of Accountants & Appraiser Services (PPAJP). |

The interview opened with an introductory session. The researcher introducing herself and briefly described the purpose of the study, clarified what would happen with the data collected, and explained the outcomes of the study such as potential publication of a research article, report and doctoral thesis.

The participants were advised about ethical issues. For example, the researcher gave a commitment the identity of the participants would not be revealed and the data collected would remain confidential. Before the interview started, the researcher asked permission to audio record the process. After providing all the information, the researcher asked the participants for their consent to sign a Participant's Consent form.

Although the interview guide had been carefully prepared, the questions were not always asked in the sequencing order during each interview. Instead, the researcher followed the order in which the topics came up as the interview progressed and at the same time, responded to the matters raised by the participants. Therefore the interview guide ensured that key areas and questions were answered. Accordingly, the researcher did not ask a question that has been addressed previously and new issues emerged during the process. These emerging issues were included in the follow-up interviews.

## 4.6 Data Analysis and Coding Process

This section describes the process of data coding and analysis. The coding process used in this study was the first and second cycle methods (Saldaña, 2013). Prior to data coding and analysis, data preparation was needed to ensure that data can be used for further analysis. The current study used procedures to ensure research validity, such as triangulation, member checking and disconfirming evidence.

### *4.6.1. Data Preparation*

This stage includes preparing verbatim transcripts and translation of data by the researcher. The transcription process involves recording an interview or group discussion for data analysis (Hennink et al., 2011). A transcription was done for each recorded interview. In this study, the transcription process included recording the speaker's name, employment detail and date of interview. The transcripts were labelled with an appropriate file name. After the data was transcribed, it was translated into English by the researcher.

Table 4.9 describes the distribution of participants. External auditors were the largest group of participants. Twenty-seven participants were from audit firms and the other participants were drawn from regulators and the professional accountancy body. Twenty-six transcriptions needed to be analysed from thirty-four participants because there was more than one participant from some audit firms and organisations. For example, when the participants from the Big four firms were interviewed, the researcher requested the partner to agree to the IT staff and senior auditor and/or audit manager to be interviewed. The researcher also requested partners from mid-tier and small-sized audit firms to be accompanied by audit staff responsible for maintaining and using GAS or CAATs. The researcher needed to implement this process to ensure that interview questions would be

answered as accurately as possible. If the interviews were held at the same time, the researcher defined them as one transcription. However, if the interview was held at a different time, it was defined as a separate transcription.

Table 4.9 Distribution of Participants

| Category | Number of Participants | % |
|---|---|---|
| **Audit Firms** | | |
| The Big Four | 9 | 26% |
| Mid-tier | 10 | 29% |
| Small-sized | 8 | 24% |
| **Total** | **27** | **79%** |
| **Regulators** | | |
| PPAJP | 5 | 15% |
| OJK | 1 | 3% |
| **Total** | **6** | **18%** |
| **Professional Accountancy Body** | | |
| IAPI | 1 | 3% |
| **Total** | **1** | **3%** |
| **Total Participants** | **34** | **100%** |

### *4.6.2. Developing Codes*

Saldaña (2013) defined a code as "a researcher-generated construct that symbolizes and thus contributes interpreted meaning to each individual datum for later purposes of pattern detection, categorization, theory building, and other analytic process". This implies interview data can be broken down into units comprised of a word(s), a sentence(s) or a paragraph(s), with a specific meaning for each unit of data. The identification of data can be described as a code. Once interview data has been coded, it generates a list of code. The next step is to categorise codes by selecting and separating them into meaningful part. If necessary, the researcher can recode and re-categorise the data, since the qualitative approach demands thorough attentions to interpreting data. Boeije (2010) explained that the outcomes of

category or coding is a theme. A theme is defined as the conclusion that can be implied from categories or codes. To summarize, Figure 4.15 demonstrates the connection between code, category and theme adapted from Saldaña (2013).

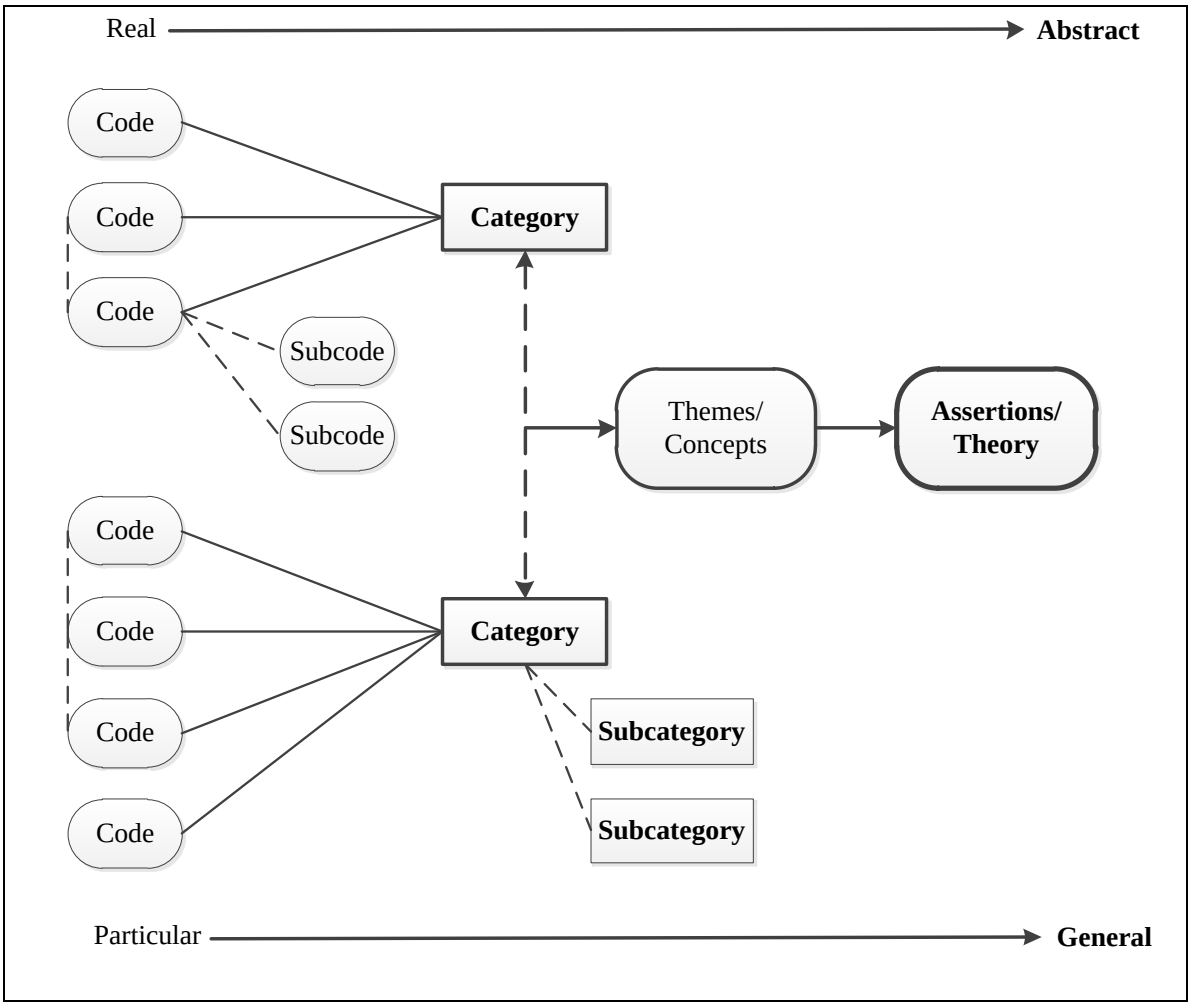


**Figure 4.15 - A Streamlined Codes-to-Theory Model for Qualitative Inquiry (Saldaña, 2013)**

Prior to field work, the researcher developed a list of codes drawn from the literature review and theory. The list of codes was used to predict the content of the interview data and to assess whether the researcher's propositions encapsulated in the research questions were well founded. The researcher also anticipated emerging codes would result in code expansion.

The data from the interview sessions was analysed using the *NVivo10* software package. By using the *NVivo* sofware package version 10, the researcher was able to manage data and

ideas, retrieve data, visualize data and report data (Bazeley and Jackson, 2013) and the focus increased on capturing the meaning of the statements recorded.

This study follows Saldaña's (2013) methods of coding and analysing interview data that are described as first and second cycle method. Miles et al. (2014) believe first cycle coding methods are coded initially for assignment to 'chunks of data' and stated "second cycle coding methods generally work with the resulting first cycle codes themselves". Saldaña (2013) recommended several methods of coding however there are not any specific rules about which method is appropriate for a particular type of research. The author asserts the selection of coding methods is the decision of researchers that due to the uniqueness of a particular research project are applied for the purpose of generating significant findings.

#### *4.6.2.1. First Cycle Coding*

In terms of this research, the interview data was transcribed into English by the researcher, coded and analysed for recurring themes using *Nvivo 10*. During the first cycle coding, the researcher used initial coding. Initial coding provides the analytical context to the researcher. The concept of initial coding is similar to Boeije (2010) description of open coding. This is performed at the beginning of the coding process once interview data has been obtained from data collection. Initial coding increases the researcher's knowledge of interview data that needs to be investigated further. Boeije (2010) described the flow of open coding as seen in Figure 4.16.

Attribute coding was used to code the demographic information of participants such as firm size and years of experience. The result of attribute coding can be seen in Table 5.11. By being informed about the participants' demographic information, it is easier for the researcher

to identify the behaviour and characteristic of each category of participants. In order to find interrelationships and differences between participants, demographic information was also helpful. For example, it was expected that opinions, perspectives and experience regarding adoption and use of GAS would be different among Big four, mid-tier and small sized firms. These differences will be easier to identify once attribute coding is applied.

To give scale to descriptive information found in the interview data this study used magnitude coding. Saldaña (2013) stated magnitude coding can be used to provide quantitative data, such as basic statistical information, for descriptive qualitative studies. In this study, the use of magnitude coding was applied for example, to quantify the use of GAS in audit firms in the form of a percentage or number. Magnitude coding was applied to find the frequency of adoption or barrier factor occurrence mentioned by participants in the interview data. Miles and Huberman (1994) advised researchers to apply the counting technique to generate meaning from qualitative data. They advised researchers to count the frequency and consistency of a particular event or opinion subsequent to it being explored. For example, after the researcher counted the occurrence of a particular adoption factor, category of frequency, such as highly influential, somewhat influential or less influential factor, could be established.

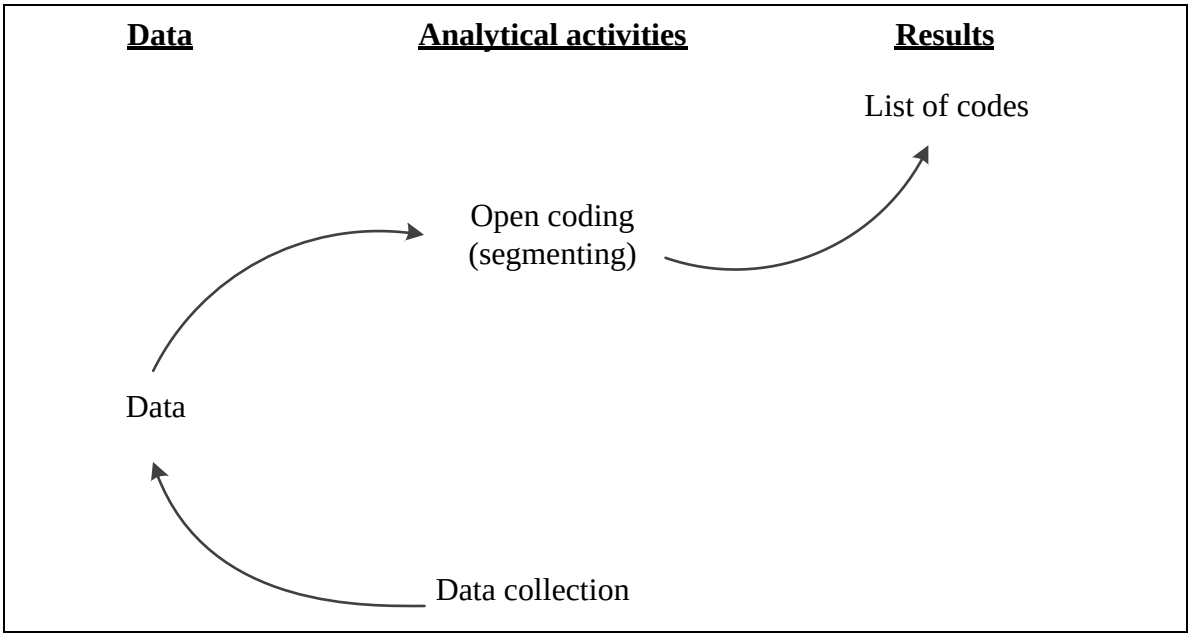


**Figure 4.16 - The Spiral Analysis of Open Coding (Boeije, 2010)**

The present study modified Ven and Verelst's (2012) considerations used to assess the level of importance and influenced of adoption and barrier factors. Modification was needed as an objective of the present study was to increase specificity about the influence level of each adoption and barrier factor, such as highly, somewhat and less influential. The following justifications were applied to the categorization of adoption factors applied in this study. If the adoption factor was rated by more than fifty per cent of all participants it was described as highly influential. The factor identified as somewhat influential, equals thirty per cent to forty-nine per cent of the total participants. The factor with the least count –less than thirty per cent- was rated as less influential.

Miles et al. (2014) defined In Vivo coding as the participants' words or terminology. Charmaz (2006) describes in vivo coding as:

1. General terms everyone "knows" that flag condensed and important meanings
2. Terms made up by participants that capture meanings or their experiences
3. Insider shorthand terms specific to a particular group that reflect their perspective.

An example of In Vivo coding in this study is ‘a champion’ that refers to an auditor experienced in the use of GAS or CAATs.

The result of first cycle coding is a list of codes (Figure 4.17). The codes are independently and unrelated to each other. The following is examples of codes resulted from first cycle coding.

- ‘SPAP’
- Audit standards
- ‘ISA’
- Compliance issue
- Minimum requirement
- ‘PSAK’
- ‘IAS’
- IT reviews
- ‘PBI’ (Regulation of central bank)
- Quality standards
- Training
- Client
- IT knowledge
- Lack of IT knowledge
- Audit course in university
- ‘Ready to deploy’ human resources
- Combined knowledge
- GAS certification
- CPA test
- CAATs mastery
- Career choice
- External factor
- Timely audit
- Client’s characteristics
- Regulatory requirements
- Client’s industry
- Audit fee
- Client’s size
- Banking industry
- Manufacturing companies
- Client’s complexity
- Complicated company
- Service companies
- Multi-finance and insurance companies
- Accounting software
- State-owned enterprise
- Non-profit institutions
- Less complex companies
- Low-risk companies
- Public companies
- etc

**Figure 4.17 - Examples of First Cycle Coding Results**

During the following stage, the researcher’s objective was to link the codes to a meaningful construct for the purpose of concept development. This process will be conducted during second cycle coding.

#### *4.6.2.2. Second Cycle Coding*

Second cycle coding was used to categorise and create themes and conceptual organisational codes results from the first cycle codes (Saldaña, 2013). The concept of second cycle coding

is similar to axial coding described by Boeije (2010). Figure 4.18 describes the flow of axial coding adapted from Boeije (2010). At this stage, based on the list of codes resulted from open coding (or first cycle coding), researcher may want to collect additional data such as follow-up interviews, secondary or archival data in order to explore the meaning of each codes and interpret it. During this stage, the researcher organised the codes into a particular category. The codes were merged with similar codes, or rejected if found to be redundant and representative codes selected. These analytical processes are described as axial coding. Axial coding can be used to determine the dominant or less important codes (Boeije, 2010, Saldaña, 2013).

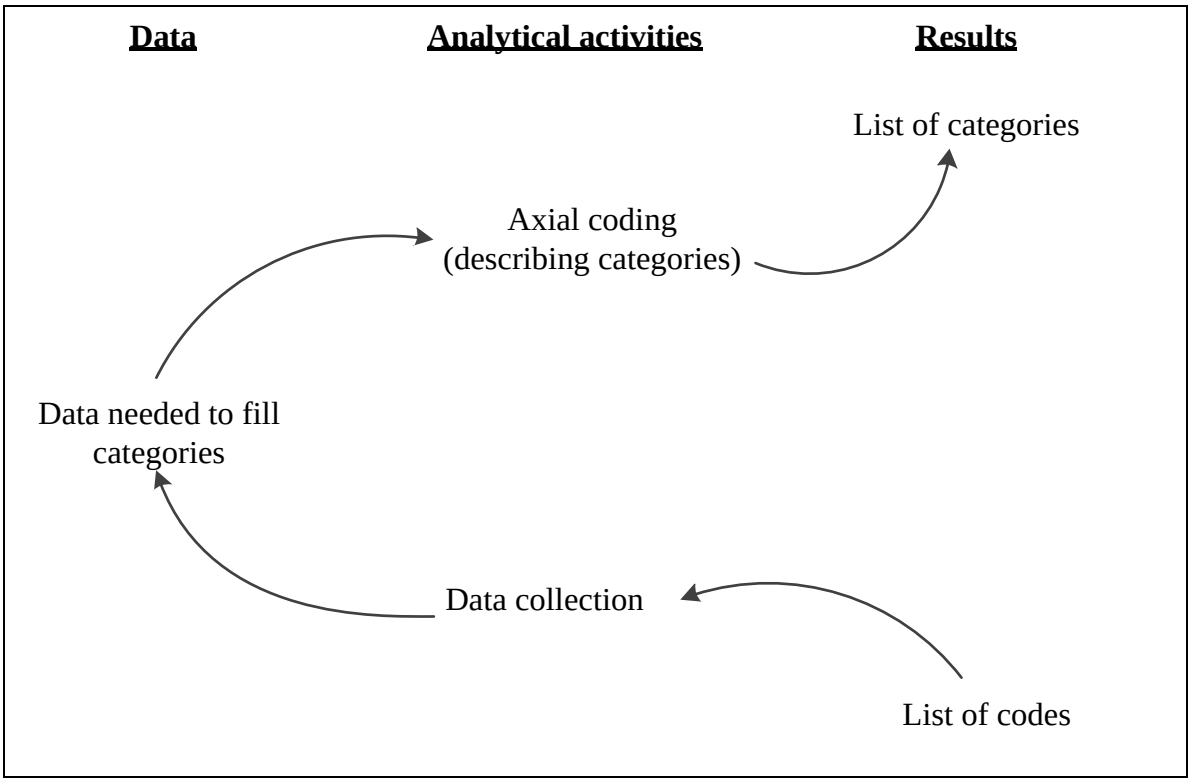


**Figure 4.18 - The Spiral Analysis: Axial Coding (Boeije, 2010)**

Second cycle coding produces a list of categories, example of codes provided in Figure 4.19, can be organised into the following categories. For example the category "Audit Standards", it used to records all codes relevant to audit standards described by participants. The category

"Related Regulatory Requirements" records regulatory requirements relevant to audit practices. The category, "Availability of IT-skilled Auditor" became apparent due to the participants' concerns about less qualified auditor in terms of IT knowledge. The last two categories record client needs and size and industry. The "Client need" category describes the client's expectation of the audit process. The "Client Size and Industry" category specifies the type of companies that need or do not need to be audited using GAS.

| List of Codes | List of Categories | List of Codes | List of Categories |
|---|---|---|---|
| • 'SPAP'<br>• Audit standards<br>• 'ISA'<br>• Quality standards | Audit standards | • Timely audit<br>• Client<br>• Audit fee<br>• Accounting software | Client needs |
| • Compliance issue<br>• Minimum requirement<br>• 'PSAK'<br>• 'IAS'<br>• IT reviews<br>• 'PBI' (Regulation of central bank)<br>• Regulatory requirements | Related regulatory requirements | • Client's industry<br>• Banking industry<br>• Manufacturing companies<br>• Client's complexity<br>• Complicated company<br>• Service companies<br>• Multi-finance and insurance companies<br>• State-owned enterprise<br>• Non-profit institutions<br>• Less complex companies<br>• Low-risk companies<br>• Public companies<br>• Client's | Client size and industry |
| • Training<br>• IT knowledge<br>• Lack of IT knowledge<br>• Audit course in university<br>• 'Ready to deploy' | Availability of IT-skilled auditor | | |

| | |
|---|---|
| human resources<br>• Combined knowledge<br>• GAS certification<br>• CPA test<br>• CAATs mastery<br>• Career choice | characteristics |

**Figure 4.19 - Examples of a List of Categories**

In summary, the following diagram demonstrates the flow of data coding and analysis applied in the present study.

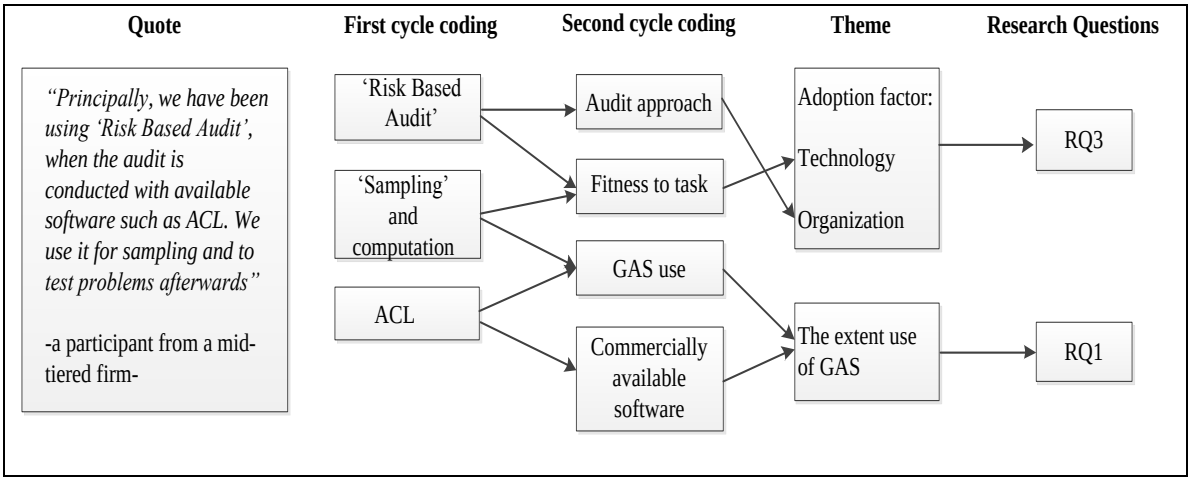


**Figure 4.20 - The flow of data coding and analysis**

Figure 4.20 shows during first cycle coding, the researcher coded a quote from participants using initial coding. Initial coding provides the analytical context for a specific quote. In this case, the researcher coded the quote and labelled it with "'Risk Based Audit'", "'Sampling' and computation" and "ACL". In the second cycle coding, based on the results from first cycle coding, the researcher re-coded and categorised the quote and labelled it as "audit approach" informed by text describing "risk-based audit". Another code was "fitness to task" and "GAS use" because the text described the use of ACL in audit practices. The final code derived from the quote was "commercially available software". This code describes the use of ACL by the participant as pertaining to commercially available software.

After the interview data was coded, the next stage was to theme the data. This stage describes how the codes fit into specific categories in order to answer the research questions. At this stage, the researcher referred to the literature to categorise the codes. For example, "Audit approach" was categorised as the organisational context in the adoption factor section. "Fitness to task" was categorised as technology. "GAS use" and "Commercially available software" were categorised as the extent of GAS use. Finally, the researcher linked each category to the appropriate research questions.

## 4.7 Demonstrating the Validity of the Research

Qualitative methodology has been used in auditing and IT research, however limited qualitative research has been conducted on CAATs or GAS related study (see, for example, Debreceny et al. 2005; Dowling and Leech 2007). Qualitative researchers argue that reliability and validity are attributes of quantitative research and are not applicable to qualitative research (see, for example, Altheide and Johnson, 1994). However, some researchers assert that qualitative research needs to be assessed for its validity and suggest criteria for this purpose (see, for example, Creswell and Miller, 2000; Yardley, 2007; Morse et al., 2002). It is important for this research to demonstrate its validity and intellectual rigor hence the following describes the procedures taken to ensure both as suggested by Creswell and Miller (2000) and Yardley (2007).

*Triangulation*: Creswell and Miller (2000) defines triangulation as "a validity procedure where researchers search for convergence among multiple and different sources of information to form themes or categories in a study". They argue that triangulation can be used to validate research credibility from the perspective of researcher. Denzin (1989) identified four basic types of triangulation that are data, method, investigator and theoretical

triangulation. Moreover, Decrop (1999) describes two ways of triangulation, that are achieved by using different sources of data and writing field notes during and after each interview or observation session.

This research conducted data triangulation defined by Denzin (1989) as "researcher explicitly searches for as many data as possible that bear upon the event under analysis". In this research, data triangulation was conducted between interview data from each group of participants. Government agencies, OJK and PPAJP, and the professional accountancy body, IAPI confirmed data obtained from the external auditors.

As was discussed in the Interview section, the researcher conducted second stage data collection to follow-up interview data previously gathered. The follow-up interviews were needed to clarify the results of the first stage interviews. The interview results from previous data collection needed to be clarified by the participants due to some unclear answers. For example, participants from regulators such as OJK and PPAJP needed to be included in the second stage data collection. Previous interview findings identified diverse opinions among audit firm participants regarding the role of regulators as encouraging GAS adoption and use. This study sought to provide a balance of views through including interviews staff from OJK and PPAJP, and including their perspective on the role of they play in the adoption and use GAS. Previously, staff from these organisations were not identified as potential research participants, and not interviewed. This step is a verification strategy introduced by Morse et al. (2002) to increase research validity. The follow-up interviews ascertained the extent regulators or professional body levels of support and requirements increased the use of GAS and whether such are factors in the decision to use it.

It is also necessary to validate interview data with other resources such as scholarly and professional articles and relevant regulations and information. Interview data was triangulated with relevant archival records, such as International Standards on Auditing (ISA), Indonesian Public Accountant Professional Standards (SPAP), The *Public Accountant Act Number 5 of 2011* and *Indonesian Company Law number 40 of 2007*. Secondary sources such as scholarly and practitioner journal articles, IAPI's website (www.iapi.or.id), PPAJP's website (www.ppajp.depkeu.go.id), textbooks, Asian Development Bank (ADB) report 2003 and Report on the Observance of Standards and Codes (ROSC) published by the World Bank in 2005 and 2010 were also used to validate the interview data and to develop and support the arguments raised in this research. For example, auditor participants generally felt that there was not a problem with audit quality including those audits conducted manually. However, the World Bank report in 2010 indicates that there is a quality concern.

*Member Checking* is used to check the validity from the perspective of participants (Creswell and Miller, 2000). To improve accuracy of the researcher's interpretation Creswell and Miller (2000) and Yardley (2007) suggested that participants read the transcriptions or field notes prepared by the researcher to verify the content and interpretation.

Subsequent to the transcription of the interview data and follow-up interviews, the researcher sent the transcripts to each participant to ensure their comments were understood accurately. Most participants agreed with the content and interpretation of transcriptions, few made additional comments. For example, a participant from a Big four firm updated data about auditing small companies with newly-implemented GAS. The researcher included the additional comments into the final transcriptions. Once these steps were completed, an assumption was made that the interview data would be sufficiently accurate to be analysed.

*Disconfirming Evidence* is "the process where the investigators first establish the preliminary themes or categories in a study and then search through the data for evidence that is consistent with or disconfirms these themes" (Creswell and Miller, 2000). Yardley (2007) claims disconfirming evidence limits the wider application of findings. This research involved audit firms of all sizes. It was expected that there would be disagreement of opinions or perspectives between participants from different sized firm. For example, it was predicted that an auditor from a Big four firm would have different opinions to staff from small firm regarding the use of GAS enhancing audit quality.

## 4.8 Conclusion

This study uses the qualitative approach to obtain in-depth understanding about the adoption and use of GAS in Indonesian auditing firms. The use of the qualitative approach is based on the nature of the research questions for this study that explore the adoption and use of GAS through interviewing a sample of professional participants. To ensure the current study identified appropriate participants, the snowballing method was used. Another motivation for selecting the snowballing method was that the researcher believes that GAS is a sensitive topic for most, especially middle and small-sized firms.

The current study used *NVivo software package version 10* to code and analyse data from the interview sessions. The first and second cycle coding methods were applied to generate lists of categories, theme and finally to formulate the findings. During the course of this study, an aim of the researcher was to establish its validity and intellectual rigor. Data triangulation, member checking and disconfirming evidence were procedures applied in this study to ensure its validity.

# CHAPTER 5 - FINDINGS AND DISCUSSION

## 5.1 Introduction

This chapter presents the findings and discussion and is presented according to the research questions described in Chapter 1. The first section describes the context and use of GAS by audit firms in Indonesia and its context of use and answers the first research question. It describes the type of CAATs and GAS currently used and compares it to the characteristics of the user, such as the Big four, mid-tier or small-sized firms. The context of GAS use is also explored from the perspective of audit procedures. This study identifies the audit procedure(s) that need GAS the most and assesses whether it is under or over used in specific procedures.

Subsequent to defining the type CAATs or GAS used and the context of its use, the benefits of GAS are described by the study participants. The second research question is addressed in the following section that also describes the benefits of GAS adoption and use. This section discusses benefits that were identified and categorised by the size of audit firms and explains the most prevalent benefits.

It was expected that a range of benefits encourages participants to use GAS in audit practice. Therefore, the next section answers the third research question and discusses the adoption and use factors of GAS. The discussion is based on the Technology, Organisation and Environment (TOE) Framework. This section also explains the findings about how the TOE framework provides insights into its adoption of GAS in Indonesia.

The findings indicate there are factors inhibiting GAS use in audit firms. It is necessary to identify inhibiting use factors and for firms to gain assistance from regulators and the professional body. The fourth research question discusses factors hindering adoption and use of GAS in Indonesia and is constructed according to the TOE framework. The final section of this chapter is the conclusion.

Table 4.9 in Chapter 4 includes the numbers of participants interviewed for this study. There were 27 auditors, 6 staff members from 2 Government agencies (OJK and PPAJP) or regulators and one staff member from the professional body (IAPI). This study includes 18 audit firms consisted of 4 firms were the Big four, 7 mid and 7 small sized firms (see Figure 5.21).

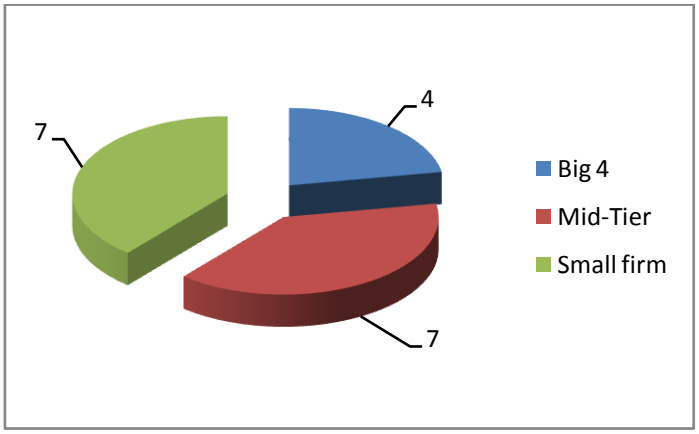


**Figure 5.21 - Participating Audit Firms**

Table 5.10 describes the profile of audit firms participating in this study. This Table lists 18 audit firms that participated in this study. Of the participating firms, 61 per cent of firms (11 firms) had less than five partners, 50 per cent (9 firms) had 10 – 20 auditors and 61 per cent (11 firms) were internationally affiliated.

Table 5.10 Profile of Participating Audit Firms

| Number of partners | Big four | Mid-Tier | Small firm | Total | % |
|---|---|---|---|---|---|
| Less than five partners | 0 | 4 | 7 | 11 | 61% |
| 5 - 9 partners | 0 | 2 | 0 | 2 | 11% |
| 10 - 20 partners | 0 | 1 | 0 | 1 | 6% |
| Over 20 partners | 4 | 0 | 0 | 4 | 22% |
| **Total** | **4** | **7** | **7** | **18** | |

| Number of Auditors | Big four | Mid-Tier | Small firm | Total | % |
|---|---|---|---|---|---|
| 10 - 20 auditors | 0 | 3 | 6 | 9 | 50% |
| 21 - 50 auditors | 0 | 0 | 1 | 1 | 6% |
| Over 50 auditors | 4 | 4 | 0 | 8 | 44% |
| **Total** | **4** | **7** | **7** | **18** | |

| International Affiliation | Big four | Mid-Tier | Small firm | Total | % |
|---|---|---|---|---|---|
| Yes | 4 | 7 | 0 | 11 | 61% |
| No | 0 | 0 | 7 | 7 | 39% |
| **Total** | **4** | **7** | **7** | **18** | |

In terms of number of participants, there were 27 external auditors across audit firms' size and Table 5.11 describes their profile.

Table 5.11 Profile of External Auditors

| Firm Size | Total | % |
|---|---|---|
| Big four | 9 | 33% |
| Mid-Tier | 10 | 37% |
| Small firm | 8 | 30% |
| Total | 27 | 100% |

| Years of Experience | Total | % |
|---|---|---|
| 3 - 5 years | 7 | 26% |
| 6 - 10 years | 6 | 22% |
| 11 - 20 years | 11 | 41% |
| > 20 years | 3 | 11% |
| Total | 27 | 100% |

| Level of Position | Total | % |
|---|---|---|
| Manager | 5 | 19% |
| Partner | 15 | 56% |
| Senior Level | 7 | 26% |
| Total | 27 | 100% |

## 5.2 GAS Use by Audit Firms and Its Context of Use

GAS is relatively new to audit practices in Indonesia and this study describes and investigates the type of GAS used and the context of use. The first research question is:

*RQ1: Which GAS is being used by audit firms in Indonesia and what is the context of its use?*

To obtain a definition of GAS, researcher asked participants to describe their perceptions. The interviews indicated that most participants from small-sized and some mid-tier firms described *MS Excel* as GAS even though Figure 1.1 in Chapter 1 suggests this software

program is more appropriately described as CAATs. A participant from a small firm, said: "We use *MS Excel* for the audit process, 70 per cent of audit work is done using *MS Excel*. We would not be able to work without it. We developed our own *MS Excel*-based audit program, and clients use *MS Excel* to record their financial transactions".

The interviews indicated that all participants were aware of the existence of GAS, however this finding does not support Ahmi and Kent (2013) findings. They found some respondents were unaware of the existence of GAS, although their study was focused on external auditors from across the UK.

Through using attribute coding it was apparent that of the eighteen audit firms (Table 5.12), 61 per cent of them were internationally affiliated audit firms, including the Big four firms. From Table 5.12 it is apparent that only 44 per cent of audit firms use GAS in their audit process as defined in this study (see Figure 1.1 in chapter 1) and includes all Big four firms, 3 mid-tier firms and 1 small firm as indicated using GAS. This implies that, except for the Big four firms, international affiliation does not always provide Indonesian audit firms with adequate motivation for and/or resources to adopt GAS.

Table 5.12 Use of Gas

| **Use of GAS** | **Number of Audit Firm** | | | | **%** |
|---|---|---|---|---|---|
| | **The Big four** | **Mid-Tier** | **Small firm** | **Total** | |
| Yes | 4 | 3 | 1 | 8 | 44% |
| No | 0 | 4 | 6 | 10 | 56% |
| Total | 4 | 7 | 7 | 18 | 100% |

To remain competitive, local audit firms establish affiliations with international audit firms. International affiliation enables firms to develop staff skills, talent and resources. Specifically, it enables firms to improve their capability to serve clients by sharing standards, methodology, best practices and marketing support from their affiliates. Moreover, affiliation raises the possibility that a local firm could audit a referral client from an international affiliate. A senior auditor from a mid-tier firm said equivalent audit software was used to audit a referral client from the firm's affiliate to ensure uniform procedures were applied and the same level of audit quality achieved. There is international evidence that suggests affiliation does not necessarily lead to increased technology or competencies (Firth, 1993). Although this area needs to be studied further, the condition of the Indonesian audit market suggests that local (small and mid-tiered) firms affiliate in order to gain prestige and enhance their bargaining position with clients. Furthermore one Big four participant commented these firms choose to locate their offices in the expensive central business district (CBD) rather than improve their technological capabilities:

> "I have a friend whose firm is mid-tiered and internationally affiliated and moved his office from a small shop-house to the CBD. He said his firm could charge clients a premium rate so he can expand".

However, other participants were less cynical. These participants said that international affiliation supports them in improving staff competencies and providing audit technology. A partner from one of the Big four firm said that:

> "In our firm, every person has to undertake mandatory training (including audit software training). The training is well designed and costly however it is a positive consequence from being a part of a network. That is part of our royalty payment".

He added that affiliation also encourages improvement in the quality of audit by ensuring compliance with the affiliate's quality standards.

In terms of the sources of GAS, participants were requested to describe their use of GAS or other audit tools. Table IV describes GAS and audit tools used by audit firms. The Big four firms use internally developed and commercially available audit software (such as *ACL* or *IDEA*). Seven out of ten participants from mid-tier firms use *ACL* or *IDEA*. However, three participants from these firms stated they also use internally developed software. A senior auditor from a mid-tier firm described the use of internally developed software:

> "Our firm is using "(*GAS name)"* to record audit documentation as well as to perform audit process (sampling, test of control, and other functions)".

In small-sized audit firms, *Microsoft Office* products are the only source of audit tools and therefore more accurately described as CAATs rather than GAS. However, a partner from a small firm stated his firm has been using *ACL* in a limited manner and described his *ACL* use:

> "*ACL* is only used to draw a conclusion from data and whenever it is needed, we use a simple *SQL*[8]"

Table 5.13 describes *MS Excel* as the most frequently used audit tool by external auditors. *MS Excel* is used for data sampling, determining materiality and conducting analytical review. A partner from a small audit firm stated:

> "We are using an *MS Excel*-based program for sampling, determining materiality, conducting ratio analysis and documenting working papers".

[8] Structured Query Language: a programming language for accessing, maintaining and manipulating databases.

Table 5.13 Current Use of Gas

| Tools | External Auditors | | | | % |
|---|---|---|---|---|---|
| | The Big four | Mid-Tier | Small firm | Total | |
| | 9 participants | 10 participants | 8 participants | 27 participants | |
| *ACL* | 4 | 3 | 1 | 8 | 30% |
| *IDEA* | 2 | 4 | 0 | 6 | 22% |
| *MS Excel* | 9 | 10 | 8 | 27 | 100% |
| Internally Developed | 9 | 3 | 0 | 12 | 44% |

Note: Participants might use more than one tool

The participants specified *MS Excel* functions such as data filtering, data sorting, formula creation or pivot-tabling. These functions help auditors conduct the audit process and a partner from a small-sized firm said:

> "We use *MS Excel* to perform substantive tests such as to verify journal entries, trace back transactions or calculate ratio analysis by using the pivot-table function provided by *MS Excel*".

However, a staff member from PPAJP who is responsible for reviewing audit practices throughout Indonesia explained the difference:

> "It was difficult for me to find an audit trail in an *MS Excel*-based audit. For example, we could not identify audit judgments, audit procedures and supporting documents used by auditors. In contrast, it was easy for me to follow the audit process from a firm that used audit software".

This observation suggests that audit quality within many smaller firms may be difficult to substantiate.

Participants were requested to identify audit tools that are used in all stages of the audit process. Table 5.14 describes the extent of GAS use and demonstrates that *ACL* or *IDEA* can be used at every stage of the audit process except report writing. Internally developed software is used at all stages and as one partner from the Big four said:

> "We have adopted paperless working conditions. We have our own software to document working papers and audit software to do data sampling. We also have software for analytical purposes, we use it to test journal entries or anything we suspect has errors. One of the software packages we own is rigorous and ensures all audit procedures have been completed".

The result shows that *MS Words* was not used to create working papers however it was relevant to other stages.

Table 5.14 The Extent of GAS Use

| **Tools** | **Working Paper Creation** | **Working Paper Review** | **Working Paper Documentation** | **Audit Report Writing** |
|---|---|---|---|---|
| *ACL* | 6 | 1 | 4 | 0 |
| *IDEA* | 4 | 1 | 1 | 0 |
| Internally developed software | 5 | 6 | 9 | 2 |
| *MS Excel* | 20 | 17 | 18 | 10 |
| *MS Words* | 0 | 9 | 10 | 19 |

Note: Participants might use more than one tool

The researcher requested participants to describe their use of GAS. Based on their comments, the researcher categorised use in accordance with the CAATs-related audit procedures that are the International Standards on Auditing (ISA) published by IAASB (2013) used by

Janvrin et al. (2009) and Ahmi and Kent (2013). Table VI describes the extent of GAS use categorised by CAATs-related audit procedures and audit firm's size.

From Table 5.15, it can be seen that internally developed software was common only to the Big four. The use of *ACL* or *IDEA* was limited to the Big four and mid-tier firms to test entire populations instead of sampling. This is understandable given the capacity of *ACL* or *IDEA* to process a large volume of data is an advantage. Most of the Big four firms rely on internally developed software to evaluate fraud risk, to test journal entries and other adjustment, to select sample transactions for testing and to obtain evidence about the effectiveness of internal controls.

In conclusion, the use of IT by Indonesia auditors, particularly CAATs or GAS, as prescribed by ISA, remains relatively low. For example, the use of internally developed software in mid-tier firms was less than 50%. Moreover there was not any indication that small-sized firms used this kind of software. A partner from a small-sized firm said:

> "We use *MS Excel* for the audit process, because it forms the basis of a program. 70% of audit works is done using *MS Excel*. We wouldn't be able to work without *MS Excel*. We develop our own *MS Excel* -based audit program, as clients use *MS Excel* to record their financial transaction".

However, the use of commercially available software (*ACL* or *IDEA*) in mid-tier firms was similar to the Big four firms, and very low use was recorded in small-sized firms.

Table 5.15 Gas Use Categorised by CAATs-Related Audit Procedures

| **Computer Related Audit Procedures** | **The Big four** | **Mid-tier** | **Small-sized** |
|---|---|---|---|
| | ***9 participants*** | ***10 participants*** | ***8 participants*** |
| ***Internally developed software*** | | | |
| To evaluate fraud risks (ISA 240[9]) | 56% | 20% | 0% |
| To identify journal entries and other adjustments to be tested (ISA 240 and ISA 315 (Revised)[10]) | 44% | 10% | 0% |
| To check accuracy of electronic files (ISA 500)[11] | 44% | 10% | 0% |
| To select sample transactions from key electronic files (ISA 500) | 44% | 20% | 0% |
| To obtain evidence about control effectiveness (ISA 330)[12] | 33% | 20% | 0% |
| ***Commercially available software (ACL or IDEA)*** | | | |
| To sort transactions from key electronic files (ISA 500) | 44% | 40% | 13% |
| To test entire populations instead of a sample (ISA 240 and ISA 330) | 56% | 50% | 13% |

Note: Participants might use more than one tool

## 5.3 Perceived Benefits to GAS Adoption and Use

Previous studies claim the use of audit technology provides benefits, such as increasing the accuracy, effectiveness and efficiency of audit processes (Janvrin et al., 2008b), enhancing the quality of audit procedures (Manson et al., 1998) and increasing audit quality (Dowling,

[9] The Auditor's Responsibilities Relating to Fraud in an Audit of Financial Statements.
[10] Identifying and Assessing the Risks of Material Misstatement Through Understanding the Entity and its Environment.
[11] Audit Evidence.
[12] The Auditor's Responses to Assessed Risks.

2009). This study's aim is to understand the benefits of GAS adoption and use by Indonesian external auditors therefore, the second research question is:

*RQ2: To what extent do Indonesian external auditors believe GAS provides benefits that improve the quality of the audit process?*

The interview data found that external auditors believe the use of GAS provides benefits, such as enabling audit firms to compete with firms of the same size, improve efficiency, improve audit quality, increase productivity and ensure uniformity of audit work. A partner from a mid-tier firm said:

> "The [audit] tools are really helpful, in terms of its efficiency, accuracy and it provides added value as well as an increase in quality. We are now using risk-based approach and want to adopt ISA".

Since the size of audit firms vary, the interviews demonstrated differences of opinion hence the identified benefits were varied. Figure 5.22 shows the benefits of GAS adoption and use. The discussion of each benefit is structured in accordance with the benefits listed in Figure 5.22.

### *5.3.1. Competitiveness*

IT literature documents the impact of IT use on the competitiveness of companies (Peña-Vinces et al., 2012, Eraqi, 2006, Powell and Dent-Micallef, 1997). Furthermore, the TOE literature delivers mixed results regarding the issue of competitive pressure as the characteristics of IT adoption varied. For example, Ming-Ju and Woan-Yuh (2008) found that competitive pressure was not a significant driver to ERP[13] adoption however studies in different IT adoption settings, such as e-business, e-CRM[14] and e-Government found it was

[13] "Seamless integration of processes across functional areas with improved workflow, standardization of various business practices, improved order management, accurate accounting of inventory and better supply chain management" MABERT, V. A., SONI, A. & VENKATARAMANAN, M. A. 2000. Enterprise resource planning survey of U.S. manufacturing firms. *Production and Inventory Management Journal,* 41**,** 52-58.

[14] "It integrates and simplifies all customer-related processes through internet and helps leverage integrated information on customers to improve customer acquisition, customer development and customer retention by managing deep and long lasting relationships TE-MING,

important (Lin and Lin, 2008, Pudjianto and Hangjung, 2009, Te-Ming et al., 2005, Zhu et al., 2003a, Zhu et al., 2003b, Zhu and Kraemer, 2005). In auditing literature, empirical research (such as, Dowling 2009; Janvrin, Bierstaker & Lowe 2008; Manson et al. 1998) has not found that GAS use contributes to a firm's competitiveness.

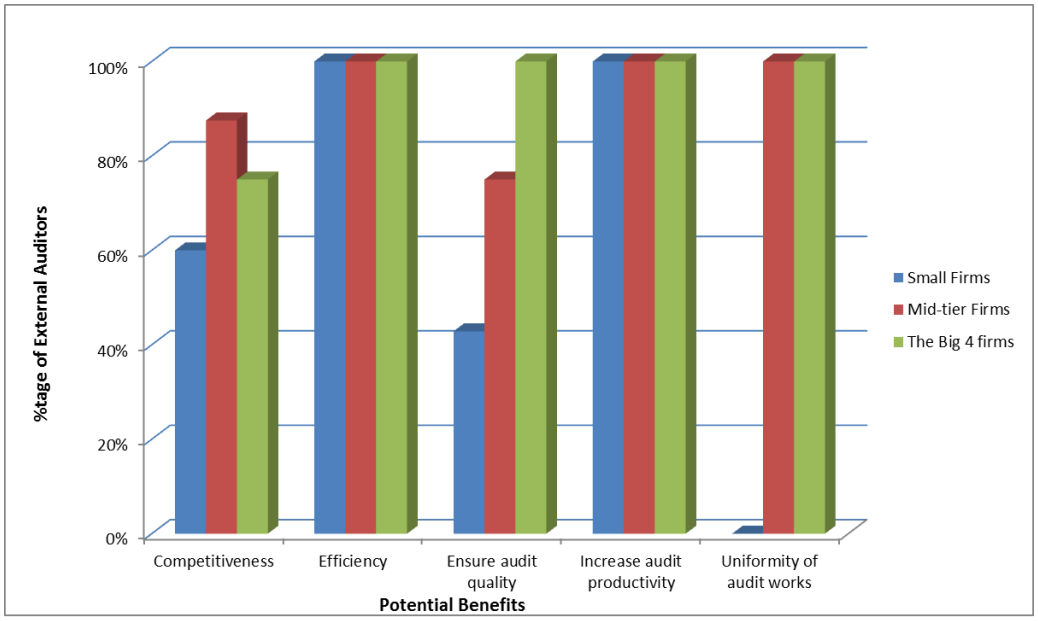


**Figure 5.22 - The Benefits to GAS Adoption and Use**

The current study found mixed results regarding GAS adoption and use with regard to the competiveness of audit firms (see Figure 5.22). It was found that not all participants believed the adoption and use of GAS enabled them to be more competitive. Most small firms tended to believe the adoption and use of GAS had nothing to do with competitiveness. Participants argued that clients did not expect firms to use of GAS. For example, a partner from a small-sized firm said:

> "Using audit software does not correlate with competitiveness. Clients do not compel us to use audit software. What matters to the client is the auditor's opinion".

A senior auditor from a Big four firm supported this statement by saying:

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C., LIN-LI, L. & WEN-FENG, H. An empirical study on the e-CRM performance influence model for service sectors in Taiwan. e-Technology, e-Commerce and e-Service, 2005. EEE '05. Proceedings. The 2005 IEEE International Conference on, 29 March-1 April 2005 2005. 240-245.

> "Competitions is not a consideration for using GAS and clients do not consider if firms use audit software or not. What matters the most to the client is the audit results".

Another reason GAS was not perceived as contributing to a firm's competitiveness was described by a partner from a small firm. He said that winning a client was not the main consideration for the use of GAS because "a firm's markets are shared". A senior auditor from a mid-tier firm described the issue of sharing markets:

> "Big clients choose a larger firm that has foreign affiliation because it is more professional. This kind of firm has facilities to do the audit in detail".

A partner from a mid-tier firm said the adoption and use of GAS influenced a firm's competitiveness.

> "In our firm, the use of audit software is compulsory because it is important to compete especially when we want to audit State-Owned Enterprise (SOE). For that we have to bid to obtain the audit assignment and higher scores will be given for audit firms who include IT in delivery of an audit".

A firm usually needs to update its technological capability to remain competitive. This is an appropriate response to IT implementation in a client's company was raised by a partner from a mid-tier firm, who said:

> "Because it [GAS use] is compulsory, it means if we do not use it we will be left behind competitively; hence we need to adapt to the change of environment".

Notwithstanding the above results, some participants believe GAS use provides a competitive advantage and users acquire a positive reputation among clients. A partner from a mid-tier firm said:

> "By using audit software, we feel superior when we negotiate prices. We mention we have invested in audit software and that justifies an increase in price".

A partner from another mid-tier firm confirmed this statement, "technology use enables us to keep clients and it also increases the prestige of the firm".

Previous research has been concerned with the competitiveness of smaller audit firms in terms of the adoption of IT (Manson et al., 1998, Janvrin et al., 2008b). However, they did not investigate the influence of GAS adoption and usage on the audit firm's competitiveness from within an empirical paradigm. The present study found that perceptions about competitiveness varied across the size of the audit firms. Several small audit firms believed competitiveness is stimulated by a variety of factors and not the sole outcome of using GAS. Small firms said GAS use does not contribute to competitiveness because their client's relatively uncomplicated financial transactions and IT platforms do not warrant it. Mid-tier firms were more likely to believe that increased competitiveness was a result of using GAS than small firms. Mid-tier firms indicated they needed to improve their technological capability in order to compete with larger firms such as the Big four, to secure a major client. They believed improved technological capability could be used to negotiate the audit fee and increase confidence at the same time. Similarly Big four firms were more positive about GAS offering a competitiveness advantage.

### *5.3.2. Efficiency*

The interview data demonstrates there is agreement among auditors that greater efficiency is a benefit of GAS and this finding supports previous research in an audit setting. For example, Dowling and Leech (2007) found the use of computerized audit support systems improves efficiency in terms of decreasing audit time. Braun and Davis (2003) found *ACL* users believed the software provided accuracy and efficiency. However, they did not specify the source of perceived efficiency.

The participants defined efficiency as cost and time saving. In terms of cost saving, a senior auditor from a small audit firm said:

> "Another benefit of audit software is to decrease the cost in document storage (hardcopy) because by using it we can store the data electronically".

A partner from a Big four firm reaffirmed the previous statement. Cost saving can be achieved by reducing audit team members, as stated by a partner from a small-sized firm: "It [GAS] minimizes personnel that are employed (fewer member of an audit team)". This statement was supported by Omoteso et al. (2010) who found the implementation of IT in audit firms creates a leaner organisational structure, as it reduces the number of administrative or junior audit staff. However, the cost saving produced by fewer staff only occurs if the client's IT provides high quality documentation and its security (Banker et al., 2010).

Literature indicates IT investment in companies reduces production costs. For example Banker et al. (1990) found that cash register and order coordination technology deployment in restaurants provided cost efficiency in comparison with those that did not use technology. Lucas et al. (1996) in their case study on the implementation of financial imaging systems in Merrill Lynch found that cost reduction resulted from new systems. Lee and Menon (2000) found higher hospital investment in IT reduced operational costs. There is limited research in this area in the auditing context and contrasting findings were found by Banker et al. (2010). They found client's IT complexity influenced effort made by public accounting firms. This means increase of IT effort contributes to increased audit costs. However, the present study found the use of GAS decreases audit cost, as indicated by an audit manager from a small-

sized firm who said: “The use of audit software can reduce fees, thus it would be more competitive from the perspective of price”. A partner from a Big four firm said: “Without the tools everything will be more expensive”. These findings support Manson et al.’s study (1998) that found medium size firms in the UK reported that audit cost reduction was a significant benefit from audit automation.

Efficiency is achieved in the form of time saving. Most participants agreed the use of GAS enabled the audit process to be faster with less time spent on clerical work and more on data analysis or other strategic tasks, such as business risk assessment. Efficiency was also described in terms of audit process effectiveness, for example a partner from a mid-tier said:

> “The audit process includes a lot of judgment and audit software can assist in reviewing these quickly whereas the manual process cannot control the process”.

This study is consistent with Dowling and Leech (2007) who argued that the use of computerized audit support systems improves efficiency in terms of decreasing audit time. A partner of a Big four firm said:

> “If we audit a large volume of data, we only make the script and the logic [computer coding program] to be executable and the result is quick. This can save an hour”.

A partner from mid-tier said: “By using the software, the series of tests can be done faster”. A partner from a small-sized firm provided a detailed explanation regarding the time spent between the manual audit and GAS use:

> “The manual [audit] took longer and resulted in a large amount of documents that stood a huge chance of getting lost. Meanwhile the one that used audit software had faster processes and fewer documents and only the authentic or permanent files are stored in the computer and backed-up regularly”.

### *5.3.3. Ensuring Audit Quality*

Manson et al. (1998), stated that through automation, audit quality improvement outweighed other benefits such as cost reduction. Francis (2011) said improved audit quality begins at the input level where evidence is acquired and reliable testing procedures can be applied in an efficient and objective manner. Audit quality can also be established at the audit process level when the auditor is able to make informed decisions about the type of tests and procedures that need to be implemented. This current study endorses Francis's (2011) discourse.

Several participants from the Big four believe that GAS adoption and use ensures audit quality by increasing accuracy and completeness and a senior from a Big four firm stated:

> "From the perspective of accuracy, audit software enables us to identify risk aspects at the beginning of the audit process, so testing can be done accordingly to its risk".

A manager from a mid-tier firm said, "The work will be more accurate and the possibility of unexecuted audit procedures will be reduced". Computation accuracy and completeness of audit procedures enable auditors to prepare accurate audit results, as was found by Banker et al. (2002).

Furthermore, a quality audit can be defined by the extent "the auditor complies with auditing standards and issues the correct opinion regarding the client's financial statements at an appropriate level of audit risk" (Francis, 2011). Dowling and Leech (2007) interviewed partners and found the use of audit support systems increases audit quality through

compliance with auditing standards and methodology and this study found similar results. An audit manager from a Big four firm said:

> "Audit software contributes to audit quality because its emphasis is on compliance with SPAP[15] and ISA[16]. If we comply with the software, then most likely we have audited in accordance with SPAP and ISA".

However there is mixed evidence regarding this finding. A partner from a small audit firm said:

> "Audit software is just a tool. I do not think that by using the software, we can increase quality. Audit quality means the extent to which we can achieve audit standards. Therefore if the audit standard requirements are met that means the audit has beneficial qualities and it does not matter which software is being used".

Staff from PPAJP agreed with this statement.

Participants argued that GAS ensures the audit procedures will be implemented thoroughly and the audit monitoring process improved. A participant from a small-sized firm explained:

> "The use of audit software will be easier for the senior level auditor to monitor the procedures that have or have not been done. Compared to the manual audit process or *MS Excel*-based, the use of audit software ensures that none of the audit procedures are missed. However, if the audit process is conducted manually there is still a possibility a procedure will be missed".

A partner from a Big four firm agreed by saying:

> "By using audit software, we have to follow the pre-determined procedural flow therefore we can ensure staff have completed the process correctly. By using audit software, if there are steps left undone, the data cannot be archived by the software. Also, if there are errors there will be warnings provided by the system".

A partner from a mid-tier firm agreed and said:

[15] Indonesian Auditing Standards
[16] International Standards on Auditing

> "The monitoring process will be easier because the supervisor can see directly if there is an unexecuted procedure and it would not be possible to miss any procedure during the audit stages".

As discussed above, results are mixed regarding the use of GAS providing benefit of assured audit quality. Figure 22 shows small firms are less convinced about the benefits. A partner from a small-sized firm said:

> "As for the result [audit quality], as long as the procedure that is performed is complete, there would not be any difference [between manual audit and GAS]".

However, the Big four and mid-tiered firms have different opinions, as expressed in a comment from a partner from a Big four firm:

> "In my opinion and from the perspective of the auditing profession, the consideration for using audit software is the audit quality. From the consideration of audit quality, we have to develop tools that the make audit process efficient and effective".

An audit manager from a mid-tier firm had a similar opinion:

> "Audit quality should be a consideration in using GAS. Auditing work has a time constraint. From this time constraint, we need to ensure we provide maximum output, so if we audit manually, we can never make optimal use of the time. This is why we need tools of assistance".

As discussed previously, GAS is used extensively in Big four firms. This study provides evidence that more participants from Big four firms agree that GAS use ensures audit quality more than those from mid-tier and small firms. It is interesting that the results of this study imply small firms are more skeptical than large firms about the contribution GAS makes to increased audit quality. However, this finding supports Janvrin, Bierstaker and Lowe (2008b) who claim increased quality audit can potentially be produced from the use of IT and

endorses Sirois and Simunic (2010) assertion that the size of investment in technology is a significant predictor of audit quality and fees.

### *5.3.4. Increased Audit Productivity*

The interview data indicates that participants believe improved audit productivity is a benefit of GAS. The literature shows there is limited support for productivity gains through IT implementation in an audit setting. However Banker et al. (2002) and Hsihui et al. (2011) are two studies that found that IT implementation increases productivity in audit firms.

While Banker et al. (2002) and Hsihui et al. (2011) measured a wide-range of IT, including computer hardware and software, this study provides specific evidence that participants believed increased productivity resulted from the adoption and use of GAS. Janvrin et al. (2008b) stated that audit productivity can also be achieved through knowledge sharing between auditors and previous research provides support for this belief. Vera-Muñoz et al. (2006) said that IT implementation could enhance information and knowledge sharing capabilities. Indications from this current study are that GAS enables knowledge sharing capabilities and an audit manager from the Big four said:

> "Our system provides an "information button" which tells us that an auditor should act according to the standards/procedures explained in ISA. The "knowledge button" gives examples of actions that need to be taken and our system is integrated with headquarters, which provides templates according to the client's industry. Auditors can use and customize the template according to client needs".

### *5.3.5. Uniformity of Audit Work*

This study confirms the adoption and use of GAS ensures uniformity of audit work and can be described as audit processes and quality. In terms of the uniformity of audit process, a

manager from a mid-tier firm said, "Internationally standardized audit tools are rigid and detailed such as the use of pre-determined templates or checklists". This statement was confirmed by a senior auditor from a Big four firm:

> "A standardized audit process ensures professional standards are present in audit work hence the quality of the audit between auditor A and B is the same and this is what creates the need for audit software in a big firm".

In terms of the uniformity of audit quality, a partner from a Big four firm said:

> "From the perspective of client consistency we standardize our approach. Our audit software has the same standards as the firm's headquarters and branches all over the world therefore we deliver standardized audit quality to our clients".

This finding supports Dowling and Leech (2007). However, Figure 22 demonstrates that uniformity of audit work was seen as a benefit by mid-tier and the Big four firms, whereas small firms had a different opinion. This may be understandable given that small firms have less experience and knowledge of using GAS.

## 5.4 Adoption and Use Factors of GAS by Indonesian Audit Firms through the TOE Framework

A primary aim of this study is to identify the adoption factor of GAS use by Indonesian audit firms. Therefore, the fourth research question is:

*RQ3a: What are the factors that have led to increased adoption of GAS in Indonesia?*

The qualitative data is summarized in the following tables. Table 5.17 records the adoption factors derived from the interviews across the full sample. To determine the highly or less influential factors, the following issues were considered: the factor with the highest count -

equal and more than fifty per cent of the total auditor- was coded as highly influential. The factor was identified equals thirty per cent to forty-nine per cent of the total auditor was coded as somewhat influential and the factor with the least counts -less than thirty per cent- was rated as less influential. This approach is based on Ven and Verelst's (2012) study that assessed the level of importance and influenced of adoption and barrier factors. However, modification was necessary as an objective of the present study was to increase specificity about the influence level of each adoption and barrier factor, such as highly, somewhat and less influential.

The interviews identified differences between audit firms hence the level of adoption factors were varied. Appendix 5 classifies adoption factors by audit firm size. However, Table 5.16 shows adoption factors identified as highly influential by all auditors.

Table 5.16 Adoption Factors Relevant to All Audit Firms

| Category | Adoption Factors |
|---|---|
| Technology | Compatibility with client's existing IT platform |
| | Fitness to task |
| Organisation | Auditor's attitudes |
| | Firm policy and support |
| | IT capital budgets |
| | IT skills of auditors |
| | Learning costs |
| Environment | Client's needs and expectations |
| | Client's size and industry |
| | Regulators and/or professional body level of support and requirements |

The discussion of each adoption factor is structured in accordance with the degree of influence (highly and somewhat influential) as listed in Table 5.17.

Table 5.17 Adoption Factors across Full Sample

| Category | Adoption Factors | Degree of Influence (All Participants) | | |
|---|---|---|---|---|
| | | **Highly Influential** | **Somewhat Influential** | **Less Influential** |
| Technology | Compatibility with audit firm's existing IT platform | - | - | √ |
| | Compatibility with client's existing IT platform | √ | - | - |
| | Fitness to task | √ | - | - |
| | GAS complexity | - | - | √ |
| | Language compatibility | - | √ | - |
| Organisation | Audit approach/methodology | - | √ | - |
| | Audit firm's size | - | √ | - |
| | Auditor's attitudes | √ | - | - |
| | 'Champion' or CAATs/GAS experienced auditor's | - | √ | - |
| | Firm's policy and support | √ | - | - |
| | IT capital budget | √ | - | - |
| | IT skills of auditor | √ | - | - |
| | IT support staff | - | √ | - |
| | Learning costs | √ | - | - |
| Environment | Audit standards requirements or expectations | - | √ | - |
| | Availability of IT skilled auditors in the Indonesian labour market | - | √ | - |
| | Client's needs and expectations | √ | - | - |
| | Client's size and industry | √ | - | - |
| | Foreign investment expectations in the country | - | - | √ |
| | Regulators or professional body levels of support | √ | - | - |
| | Vendor of audit software | - | √ | - |

The factor was rated highly influential if it was mentioned by equal and more than fifty per cent of the total auditors, somewhat influential if it was mentioned by equal thirty per cent to forty-nine per cent of the total auditors and less influential if it was mentioned by less than thirty per cent of the total auditors.

### *5.4.1. Technology Context*

The technological context describes the internal and external technologies relevant to the firm. This includes existing technology inside the firm, and the available technologies in the market. In an audit context, the firm may want to adopt GAS if it is compatible with its clients' IT platforms. Compatibility with audit tasks and ease of use are also relevant considerations as a technological driver in the adoption of GAS. Any technical incompatibilities relevant to GAS are categorised as part of the technological context. This study found the following technological context factors: (1) Compatibility with client's existing IT platform, (2) Fitness to task, (3) Compatibility with the audit firm's existing IT platform, (4) GAS complexity, and (5) Language compatibility. Each technological adoption factor is discussed in the following paragraphs.

#### *5.4.1.1. Compatibility with Client's Existing IT Platform*

It is defined as the extent GAS is compatible with the client's existing IT platform. TOE framework literature provides evidence that consumer or trading partner readiness (Lin and Lin, 2008, Zhu et al., 2003a) is a significant influence to IT adoption. In terms of the GAS adoption, technological compatibility with the client's IT is an important factor for GAS adoption. To date there has not been any auditing research identifying this adoption factor.

All participants agreed that compatibility with the client's IT platform is a major factor in the adoption of GAS. Firms use GAS if their clients are using complex IT and as one participant from a Big four firm stated:

> "All our clients use sophisticated ERP software, such as *SAP*, *Oracle* or *Dynamic AS*. If we do not match our clients' technology we will have difficulty performing audits".

A partner of a mid-tier firm explained:

> "It seems that almost all of them [clients] use software to record financial transactions, except the small ones that use manual techniques. Manual means they only use *MS Excel*, where data is entered into a computer and the system is simple or they may not use a system. If the client uses *SAP* or *Oracle* to record financial transactions, the auditor must use audit software".

A partner from a small-sized firm stated:

> "The more sophisticated our client's IT, the better their control and fewer components will need complex audit software. If the client's IT is *MS Excel* based, control is weak. With *MS Excel*, errors occur in financial reporting, so we have to be meticulous in auditing companies which still use this program".

Moreover, another partner from a small-sized firm said:

> "Most of our clients are small clients (not even medium), almost 80% of them are service companies so we considered it was appropriate to do [audit] it manually".

Previous research suggest auditors are required to use appropriate techniques to test computerized data for accuracy and to assure that internal control systems are safeguarded (Braun and Davis, 2003). The present study concludes that audit firms would only use GAS if the client's IT required it. When the client uses sophisticated IT systems, the firms would adjust their technological competence to make their IT compatible, and vice versa.

#### *5.4.1.2. Fitness to Task*

This construct measures perception of the extent GAS is perceived as useful to and consistent with the auditor's work. Previous research about the TOE framework found fitness to task influences IT adoption (Dedrick and West, 2003). However, previous research into auditing

found limited prevalence of this factor although Ahmi and Kent (2013) found job relevance can motivate auditors to use GAS.

The present study found support for fitness to task influences GAS adoption. For example, small firms did not consider adopting GAS because of incompatibility issues. A participant from a small-sized firm stated that: "The software's features or menu are useless because most of our clients are small service companies". This finding implies small-sized firms use *MS Excel* extensively for audit. A senior auditor from a Big four firm provided an example of the GAS fitness to his audit tasks: "The template provided by the software really helps and is important in the audit process". Moreover, a senior auditor from a mid-tier firm detailed his explanation of the use of template as follows:

> "Audit software provides a template of questions to diagnose the condition of the companies in detail. Sometimes the questions have never been thought about or anticipated by the auditor. Therefore it is easier to detect the condition of the company".

The choice of the audit approach may influence the process of adoption and as a partner from a mid-tier firm stated:

> "We have been using a risk-based audit approach and the audit is performed with available software, such as *ACL*. We use it for sampling and to test problems afterwards".

#### *5.4.1.3. Language Compatibility*

Language compatibility has not been found as an adoption factor either in the TOE framework literature or in the auditing field. This is due to most of the previous studies being conducted in a developed economies setting, where English is the first language. Findings

from the present study show the language used in GAS which is usually developed by foreign vendors in English is difficult to understand for users whose English is not proficient. This reality has caused problems for small-sized firms in Indonesia however, this finding has mix results. As described in Appendix 5, small-sized firms found language compatibility to be an important factor but mid-tier firms and the Big four firms stated it was a somewhat and less influential factor, respectively. Big four auditors believed that English did not cause a problem because they use it in daily communication. An audit manager from a Big four firm said: "Language is not an issue because we are used to English, so it is not an obstacle".

Clearly, to use this software, auditors in small firms need to improve their English skills. A partner from a small audit firm stated: "Not all my auditing staff speak English well. The terminology used in GAS is in English". Moreover, a mid-tier audit firm also found language was an obstacle to the adoption of GAS and a partner stated:

> "The barriers and obstacles to the use of audit software is language as the templates of procedures are in English. Our auditors prefer audit software in the Indonesian language".

### *5.4.2. Organisational Context*

The organisational context is defined by Tornatzky & Fleischer (1990b) as: firm size and scope, centralization, formalization, complexity of its managerial structure, the quality of its human resources, and the amount of resources available internally. In an audit context, the relevant factors are the firm's size (the Big four, mid and small-sized firms), the intention to use GAS, the skills of auditors and the IT capital budget. This study found the following organisational factors drive GAS adoption: (1) Audit approach/methodology, (2) audit firm size, (3) auditor's attitudes, (4) a 'champion'/auditor's experience with CAATs or GAS, (5)

firm's policy and support, (6) IT capital budget, (7) IT skills of auditors, (8) IT support staff, and (9) learning costs. Each organisational adoption factor is discussed in the following paragraphs.

#### *5.4.2.1. Auditor's Attitudes*

IT literature describes attitude as an important factor for IT adoption. The theory Acceptance Model (TAM) suggests intention to use specific IT is driven by its perceived usefulness and ease of use (Legris et al., 2003). Moreover, Agarwal and Prasad (1998b) believe personal innovativeness can be used to predict the intention to adopt IT. They defined personal innovativeness in the IT domain as "the willingness of an individual to try out any new information technology" (Agarwal and Prasad, 1998b). The findings of this current study support the above assertion.

In terms of GAS adoption, the auditor's attitude includes the willingness to use GAS and perceptions regarding its use. Previous research investigated the auditor's attitude to GAS use and found the intention to use audit support systems was influenced by it (Dowling, 2009). Most participants from the Big four and mid-tier firms emphasized the importance of ease of use as the main factor towards a positive attitude to GAS. A senior auditor from a mid-tier firm said:

> "If the software is easy to use, auditors will be interested in using it. If it's difficult at the beginning, it will hinder the use, consequently more effort will be needed for auditors to use it".

A participant from the Big four also stated:

> "From the auditor's perspective, the use of audit software is about ease. The more practical assistance audit software gives to auditors, the more motivation there will be in using it".

However small-sized firms were more concerned about the benefits of GAS use and a partner stated: “Audit software is not easy to use however the benefits will encourage the auditor to use it“.

A partner from a mid-tier firm observed that younger staff tended to be more receptive to the use of GAS. He explained:

> “Auditors who are open towards the implementation of GAS are the ones that are young and technology-minded. They usually like it when they are given challenges and tasks that enable them to explore their computer ability. On the other hand, auditors who are not so interested in IT, tend to use the computer only at a basic level according to their working requirements. They only consider computers as aiding and assisting tools and are not really interested in exploring their full capabilities”.

In summary, the auditor’s attitude is driven by ease of use, benefits offered, age and technology-minded perceptions. The first two aspects, such as ease of use and benefits offered are consistent with TAM proposed by Davis (1989). In the auditing literature, the findings of the present study supports Bedard et al. (2003). They found training in electronic working papers improved the ease of use and system usefulness and other aspects, such as age and technology-minded perceptions have not been identified in existing auditing literature. However, in UTAUT, age has been used as one of the key moderators that influence intention to use and use behavior to IT adoption. For example, older workers found it more challenging to employ new IT applications (Venkatesh et al., 2003). Furthermore, the concept of technology-minded perceptions are considered consistent with the definition of personal innovation provided by Agarwal and Prasad (1998b).

#### *5.4.2.2. Firm Policy and Support*

Fink (1998), in his research about small medium enterprises (SMEs) adoption of IT, asserts that SMEs are lacking in human, financial and material resources. SMEs rely extensively on their CEO, the owner-manager. Therefore, in SMEs the individual attitude of the CEO towards IT adoption, plays a significant role (Fink, 1998, Thong and Yap, 1995), and it is believed that similar conditions are found in the auditing context. In Indonesia, the number of sole practitioners is relatively high, and this can be seen from Figure 12 in Chapter 3. There are 186 audit firms run by sole practitioners and this study assumes the decision to adopt GAS is made at the organisational level. In a small-sized firm, the decision to adopt depends on the partner's opinion.

This study found the firm's policy to adopt IT/GAS is similar to the concept of social influence and facilitating conditions described in UTAUT. Social influence is defined as "the degree to which an individual perceives significant others believe he or she should use the new system" (Venkatesh et al., 2003). Auditing research indicates auditors are more likely to use new technology once they are aware the managing partner encourages it (Curtis and Payne, 2008). Facilitating conditions are defined as "the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system" (Venkatesh et al., 2003). IT research implies IT adoption is driven by the availability of company resources (Riemenschneider et al., 2003), therefore the existence of facilitating resources motivates GAS adoption and use. The present study defines the firm's policy and support as 'the availability of support from partner or senior staff to use GAS'.

The interviews in the present study indicated the small firm's lack of financial and human resources hinder the purchase of specific software and the internal development of its own audit software. Furthermore, the absence of partners' support in audit software use is another factor that contributes to the choice of *Microsoft Office* products as audit tools.

Partners or senior staff can support the use of GAS through providing training, facilities and encouragement. Tornatzky and Fleischer (1990b) assert encouragement can expedite the process of adoption and use of technology. Previous research suggests that encouragement from an audit partner or senior staff increases the likelihood of GAS use (Dowling, 2009, Curtis and Payne, 2008, Dowling and Leech, 2007, Janvrin et al., 2008c). The interviews with staff from the Big four and mid-tier firms confirmed that as GAS is compulsory, encouragement from audit partners is forthcoming. However, the use of GAS in small firms tends to be optional due to perceptions about high acquisition cost. An audit partner from a small firm said:

> "Instead of buying something for showing off, I prefer adding people, enlarging the team. That will have better results compared to buying an expensive thing".

This statement is understandable given labour is cheaper in Indonesia compared with computer hardware and software. These products are more expensive to purchase than in developed economies, due to exchange rate volatility (Bustaman and Jayanthakumaran, 2007). This finding confirms Manson et al. (1998) who argued that the impact of economic considerations was a critical factor in the level of IT implementation in audit firms in developing countries.

Support in Big four and mid-tier firms occurs in the form of a technology-driven policy and the provision of structured training. An audit manager from a Big four firm said: "Since working papers are no longer paper-based, my firm uses audit software on a daily basis, and it is compulsory". All Big four participants agreed with this statement. Mid- tier firms describe support to adopt GAS is varied. Some firms provided a laptop for each staff, a policy to encourage GAS use and an IT department to support GAS-related work. A partner from a mid-tier firm said:

> "One of our IT policies is 'one person one notebook'. Over the past two years, we formed an IT division. Things used to be handled by staff interested in IT but not IT experts. As time passed, IT need became increasingly complex and more problems occurred especially with GAS. So we formed an IT division. Just this year, our intranet was installed and all resources (template, audit forms, softcopy of PSAK and SPAP) are saved in one folder. It is more like a library that everybody can access. All personnel have different access rights to this library. For example, some can only read, but cannot print. Higher access rights permits more functions such as editing and printing documents. The policy of access privileges was implemented because in our firm staff turnover is pretty high".

However, another partner from a different mid-tier firm stated otherwise:

> "At our firm, there aren't any internal regulations / guidance that describe the extent to which auditors must use computers in the audit process".

IT or GAS adoption-related support and policy are ill-defined in small-sized firms. However, this does not mean small-sized firms do not provide support to their auditors. Small firms encourage auditors to use technology to an extent by providing them with a personal computer or laptop and basic software such as *Microsoft Office* however, this could not be considered GAS as defined by this study.

#### *5.4.2.3. IT Capital Budgets*

A large IT capital budget enables audit firms to invest in GAS. Investment in GAS involves purchase of related hardware and software. The concept of the IT capital budget is similar to

the concept of facilitating conditions in UTAUT and available resources in Diffusion of Innovation (DoI).

In the auditing field, Banker et al. (2002) found investment in IT has been identified as a key driver of improved productivity in public accounting firms. Existing research suggests the Big four firms provide higher quality audits and offer greater credibility to clients' financial statements than small audit firms (Francis and Yu, 2009). This in part, is due to the Big four firms possessing resources that enable them to invest in IT and provide superior audit processes (Janvrin et al., 2008b).

A large IT capital budget enables audit firms to invest in GAS. Investment in GAS includes the purchase of related hardware and software. Previous studies have suggested IT implementation in audit firms increase productivity (Banker et al., 2002, Hsihui et al., 2011). In the present study, all participants confirmed they provide IT related facilities to their auditors. The complexity of IT facilities depends on the size of audit firms and can include having their own IT department, providing a laptop, PC or software and Internet access. In terms of GAS, larger audit firms, such as the Big four develop auditing software applications internally and smaller audit firms purchase commercially available and less costly software. This supports Bierstaker et al. (2001) and repeated in a comment from a partner of a Big four firm:

> "Each staff member gets a notebook along with supporting audit software and audit methodology. We also provide a technical database (knowledge management) containing PSAK, our policy, and audit instructions. The firm's guide prepared by our affiliate, is also provided in the technical database and can be accessed all the time, be it online and offline".

A partner from a mid-tier firm said:

> "We have our own IT department to regulate the computer network, and manage the hardware and software. For senior level auditors, we provide a notebook. We also have a database/ knowledge center that can be accessed by every auditor. The access rights for auditors are regulated by our IT department".

It is evident the Big four and mid-tier firms provide not only basic hardware (PC or laptop) and software (GAS), they also provide a relevant database that can support audit work.

However, different circumstances exist in small-sized firms. Staff from small-sized firms said only basic hardware, *MS Office* and antivirus software is provided. A partner from a small-sized firm said:

> "Generally, our investment is the provision of a laptop for the employee in the form of soft loan. Other than *MS Office*, we invest in anti-virus software".

#### *5.4.2.4. IT Skills of Auditors*

The IT skill of auditors is defined as the level of IT knowledge. It is believed higher levels of auditor IT proficiency leads to higher levels of GAS use. Previous studies assert high IT proficiency among auditor would lead to increased GAS use (Brazel et al., 2010, Li et al., 2007). A recent study found the effect of IT knowledge and training increased IT use (Al-Ansi et al., 2013).

All participants agreed for increased GAS use, IT skills are essential however the skill level is different between audit firms. The effort taken by audit firms to improve IT skills varies. For example, a manager from a Big four firm said extensive training was provided to familiarize

auditors with their firm's IT environment. In relations to GAS mastery, a partner of a Big four said:

> "For new software implementation, we usually send individuals who are good performers, who have good IT, accounting & auditing knowledge to Singapore or Kuala Lumpur to learn new software".

The findings of this study indicate auditors employed by small-sized firms do not believe they need to possess high level IT skills because they do not tend to deal with complex systems. These firms tended to provide less training to improve skills and made the auditor's existing IT skills a requirement for working with the firms. A partner from a small-sized firm said:

> "In our firm, most of our auditors have mastered computers because it has been required during the recruitment process. Some of them are really good and are innovative in using the computer for an audit process".

The difficulty providing IT skilled auditors can also be the result of the age of the audit firm partners. A staff member from PPAJP explained that 50% of audit firms in Indonesia are sole practitioners and more than fifty percent of the partners are aged over sixty. According to Figure 13 in Chapter 3, 64.7% of Indonesian public accountant are aged over fifty. This aging workforce may result in fewer IT skilled auditors as older partners may be less willing to improve their IT skills than younger ones.

*5.4.2.5 Learning Costs*

Learning costs are defined as the cost of training for GAS provided by firms for their auditors. The TOE literature argues the decision to adopt new technology appears to be influenced by the compatibility of the new technology with current technologies and by skills

and tasks required (Dedrick and West, 2003). When an organisation wants to adopt a new technology requiring major changes, it incurs conversion costs. Klemperer (1987) described learning/training costs as one of conversion costs.

This factor includes the cost of GAS training provided by audit firms. An auditor with experience in accounting/auditing and IT makes a valuable contribution to the audit process but these skills are not commonplace in the profession. In addition, schools and universities do not provide audit software training curricula. Most participants in the present study agreed GAS training is essential and the Big four firms provide it to ensure auditors have these skills. A senior auditor from a Big four firm said:

> "The training in our place is quite structured. For example, if there is an update of software, all levels (staff to partner) will get training, but probably the allocation is different. Higher levels will be trained in areas relevant to them to reduce anxiety if there is a software version change. Here, we have staff dedicated to allocating training schedules".

Moreover, a partner from one of these firms said:

> "In our firm, every person has to do mandatory training. The training is well designed and costly because it is a positive consequence from being a part of a network".

The Big four firms said they send auditors to an external training provider and arrange in-house training. A partner from one of these firms said:

> "On-the-job training (such as coaching) exercises the auditors' judgment, requires human interaction, and increases their understanding of the value of our firm. Auditors acquire more knowledge in on the job training since there is discussion and sharing of information over a case. Apart from on the job training there is also a coaching process".

Participants from mid-tier firms said they arranged GAS related training internally and through training providers. A partner from a mid-tier firm said:

> "Some key staff are sent to the Indonesian Institute of Certified Public Accountants (IAPI) or Indonesian Institute of Accountants (IAI) or a credible training center".

A partner from another mid-tier firm said: "We have in-house training where I am one of the instructors or educators in auditing".

Small-sized firms do not schedule GAS training and prefer on the job training. A partner from a small-sized firm said: "The training we do is on a 'learning by doing' platform". This is understandable because GAS is not generally used in these audit practices. However, one participant from a small firm stated:

> "IAPI provides Continuing Professional Development (CPD) related to the preparation of *MS Excel*-based paper work. We familiarize ourselves with it through in-house training. We only send senior staff or managers to participate in CPD".

This indicates small firms are selective about sending their auditors to an external training provider due to a limited training budget.

*5.4.2.6 Audit Approach / Methodology*

O'Donnell and Schultz (2003a) state that audit methodology is based on a comprehensive, up-to-date understanding of the client's business and industry that is acquired through a comprehensive analysis of the management of external and internal operations. One audit

firm may use an approach that focuses on risk-based auditing whereas others may have a different focus such as the transaction cycle-based approach.

There are many studies about the application of specific audit methodology, for example, Eilifsen et al. (2001), Curtis and Turley (2007) and Robson et al. (2007). Previous studies such as O'Donnell and Schultz (2003a) found the choice of audit methodology encourages firms to adjust their support software and asserts each methodology has its own focus. An example is the way audit evidence is organised and this will be different between risk-based and transaction cycle-based approaches. The risk-based approach tends to organise the client's information based around business activities, whereas the transaction cycle-based approach arranges the client information based on account classification.

The findings of this study indicate Big four firms consider this factor to be influential because GAS is used to ensure compliance with their audit methodology. A partner from the Big four stated:

> "This audit software is developed to deliver the firm's audit methodology. The methodology is developed based on ISA and to answer the needs of rapidly developing business".

This statement supports Dowling and Leech (2007)'s finding. Conversely, only a few participants from mid-tier firms identified the importance of audit methodology as a key GAS adoption factor, and small-sized firms did not mention this factor at all. A partner from the Big four stated:

> "They (smaller firms) are still using manual working papers, with *MS Excel* or *MS Word* because the computer is not a large part of their audit methodology".

*5.4.2.7 'Champion' or CAATs/GAS Experienced Auditor*

This is defined as the availability of auditors with CAATs or GAS experience. The analysis of IS literature indicates the availability of staff experienced with new technology drives its adoption (Ven and Verelst, 2012, Dedrick and West, 2003). Therefore, a 'champion' is needed as GAS trainer and trouble-shooter. The main task of the 'champion' is to ensure GAS is used appropriately through training programs that provide solutions to problems.

The interviews imply this factor is of some importance for the Big four and small-sized firms. Due to IT complexity and the span of control in the Big four, the availability of a 'champion' is essential. A senior auditor from the Big four stated:

> "In our office we are provided with dedicated staff as a contact point if we experience difficulties in using the audit software. The staff have access to global [audit firm's name], and we receive prompt support when we experience difficulties we cannot handle ourselves".

In the Big four firms there are not many obstacles to providing 'a champion' because these firms have the resources to invest in human capital. For example, a partner from a Big four firm explains the process of providing a 'champion' in his firm:

> "From each division, they will send staff with good knowledge to Singapore to undergo training for trainers. Then they will become a trainer and 'champion' for their respective division. Those who are 'champions' at office level go to Singapore, but only 'champions' at division level did the train the trainer course".

However, small-sized firms lack auditors with IT capability to develop, maintain and deal with potential problems around GAS or *MS Excel*-based audit programs. One partner from a small-sized firm said:

> "The obstacles to use audit software are that not every auditor can be trained because it is time consuming and the initial cost of the software is high."

*5.4.2.8 IT Support Staff*

This is defined as the availability of dedicated IT support staff to maintain and troubleshoot the IT infrastructure in audit firms. IT support staff maintain and deal with potential problems around the IT infrastructure, and ensure GAS is compatible with the existing IT infrastructure and is functioning properly, IT support staff are needed.

A complex IT environment has driven the Big four and mid-tier firms to establish an IT department. While the Big four firms have their own IT departments, some mid-tier firms outsource this function to IT vendors. A partner from a mid-tier firm said: "To perform an IT review of SOEs (State-Owned Enterprises), we call in IT consultants".

*5.4.2.9 Audit Firm Size*

Extensive literature has studied the adoption of technology by larger firms (see Banker et al. (2002), Bierstaker et al. (2001), Dowling and Leech (2007) and Curtis and Payne (2008)). This research indicates larger firms are leaders in audit technology adoption hence GAS use is more extensive in the Big four firms or large firms in contrast to smaller firms.

The interviews indicated smaller firms did not generally perceive they needed GAS and as a partner from a small firm said: "Because we are a small firm, our clients are small companies.

We do not need audit software therefore we have not used it". This comment mirrors a statement from a partner of a mid-tier firm who said: "The size and category of the audit firm influences the use of GAS/CAATs because they attract big companies with complicated IT systems". The interviews provide an explanation about the importance of firm size. A partner from a mid-tier firm emphasized the following as the reason:

> "As a public accounting firm, our span of control increases with our size. The audit application helps us control our work and we can proceed as planned and the quality is consistent with the standards previously set".

### *5.4.3 Environmental Context*

The environmental context is the arena in which a firm conducts its business – its industry, competitors, access to resources, and dealings with government. In an audit context, levels of support from professional bodies and regulators, IT vendors, the client's size and industry are expected to motivate GAS adoption. This study found the following important environmental factors: (1) audit standards requirements or expectations, (2) availability of IT-skilled auditors in the Indonesian labor market, (3) client's needs and expectations, (4) clients' size and industry, (5) foreign investment expectations within the country, (6) vendor of audit software, and (7) regulators and/or professional body level of support and requirements. Each environmental adoption factor is discussed in the following paragraphs.

#### *5.4.3.1 Clients' Needs and Expectations*

Iacovou et al. (1995) claimed client expectations are one of the critical factors contributing towards technology adoption. Participants indicated their client was not concerned with audit working papers or whether auditors use GAS. However, most participants agreed clients provided motivation for GAS use as stated by a partner from a small firm:

> "The external factor that encourages firms to use audit software, is expectation by the client and includes meeting audit standards set by a regulator or standard setter through the client".

A partner from a mid-tier firm said: "Since audit software is considered a tool, the option to use it is for the firm to decide according to the needs of the client".

Staff from PPAJP said many public company audit clients preferred to use smaller audit firms, such as mid-tier audit firms, due to the lower price they charged compared to the Big four. This statement was supported by the following data. Tuanakotta (2007) reported in 2006 non-Big four firms (mid-tier and small-sized firms) dominated audit activities. From the 339 listed companies at the time 187 companies (55%) were audited by non-Big four firms (see Figure 14 in Chapter 3). In 2011, it was reported by AkuntanOnline (2013) the Big four and the non-Big four audited 15.17% and 84.83% companies respectively.

However, the client would choose a larger firm for a corporate action such as a merger or acquisition. A partner from a Big four firm said:

> "The use of GAS does not need to be regulated. However, it should be regulated since a big and complicated company cannot be audited by a small firm since it compromises the quality of the audit".

The finding that public companies are willing to employ mid-tier firms to conduct their audit contrasts with US evidence that states public companies prefer to be audited by a Big four firm (Francis and Yu, 2009).

*5.4.3.2 Clients' Size and Industry*

It is assumed business size and industry type influences GAS use by auditors. Large clients and those from highly regulated industries are more likely to adopt IT for financial reporting and this encourages auditors to use computerized audit tools when dealing with this type of client.

This study found mixed evidence about whether the client's size is an influencing factor for GAS use. A senior auditor from the Big four said: "I think that the size of clients does not influence the use of audit software." This statement is reflected in the view of a partner from a mid-tier firm who said, "Company size does not influence the need to use audit software, because it relates to audit quality". However, a senior auditor from a mid-tier firm said, "The external factor that most influences the use of audit software is the size and the complexity of the client's company". This statement is supported by a partner from a Big four firm:

> "The audit software that we currently use is based on our audit methodology be it for large, mid or small-sized companies. They will get the same audit procedure. What differentiates them is the involvement of IS auditors. For companies that are middle-sized and above, we will involve an IS auditor, because input and outputs are heavily influenced and dependent on IT. Both IT general control and IT application control need to be tested".

A partner from a small-sized firm concluded: "What we need more of is how to develop the technique or software according to the clients' needs irrespective of size".

Regarding the client's industry, most participants agreed industry characteristics are an influencing factor. A partner from a mid-tier firm stated:

> "The type of client affects the use of audit software. For example, for a client who has routine and daily transactions that are numerous, such as the banking

> industry, we have to use audit software. Hence the client's transaction characteristics influence the use of audit software".

Participants indicated the industries that need to be audited by using GAS are those with large data volumes from highly regulated industries. A partner from a mid-tier firm said:

> "Currently clients from multinational finance and insurance industries have been audited using GAS. Meanwhile, we use conventional audits for clients from trading and non-profit companies."

A manager and a senior auditor from mid-tier firms said clients from public companies and a referral client from firm affiliates also need to be audited using GAS. Moreover, a partner from a mid-tier firm highlighted the focus on data integrity emanating from a client's systems together with its internal controls:

> "In the audit process, the companies that are not fully computerized need GAS the most. This is because the system that is not integrated has weak controls, and the probability of data error is high. Moreover, the probability of data that is not uniform is also high due to the possibility of data manipulation".

On the other hand, participants from small-sized firms indicated they use *MS Excel* regardless of the client's size and industry. A partner from a small-sized firm said:

> "We encourage clients to convert their data to *MS Excel*. Therefore, the use of audit software is not influenced by client size, big or small. We as a firm, drive them".

#### *5.4.3.3 Regulators and/or Professional Body Level of Support and Requirements*

Regulators or a professional body can create audit-related regulations and standards. They also offer training and advice. The findings of this study delivered a mixed response from participants about these matters. For example, a partner from a mid-tier firm said: "There is a regulation that encourages the use of audit software however it is only a request". A participant from a mid-tier said: "A regulation exists that urges the use of IT in audit firms". However, a participant from the Big four firms said: "From the regulatory side, Government

has not issued directives to compel audit firms to use IT or audit software". A participant from small firms also gave the same response. In contrast, a staff member from the PPAJP argued that the institution encourages the adoption and usage of GAS. For example it accepts audit firms' working papers in softcopy as stated in the *Law of Accountant Public* No 5/2011, whereas previously, a softcopy working paper was not accepted as formal audit documentation.

In terms of levels of support from regulators or professional body, all participants agreed that support is limited. Support provided by the professional body tended to be in the form of training. However, a participant from a small-sized firm stated:

> "IAPI as a professional body does not provide CPD related to the use of GAS. Even if there is training, it is conceptual and not hands-on".

Furthermore, a partner from a small-sized firm said:

> "I wish IAPI had a training program that specifically addresses GAS use. CPD provided by IAPI is about the use of *MS Excel* to prepare working papers. It is expected there will be training on how to analyse financial data with *MS Excel*".

A staff member from the PPAJP explained: "To date we do not provide GAS training as using it is not our main concern". A participant from the Big four commented: "In our firm, CPD that is arranged by IAPI contributes a little towards staff professional development".

Participants were asked about the type of support they expected from regulators or the professional body. In general, they expected regulators and the professional body to take the initiative and provide support for GAS use. Specifically, participants from mid-tier and small-sized firms expected regulators and the professional accountancy body to provide affordable

GAS that can be customized to the needs of audit firms and their clients. A partner from a mid-tier firm said: “Regulators could provide the software. They buy the software license and the firms will be the sub-licensee”. Participants from mid-tier and small-sized firms also expected that regulators or the professional accountancy body would provide GAS training and subsidize training fees. A participant from a small-sized firm proposed:

> “Regulators have to provide a facility in CAATs. The facility could be in a form of training relevant to GAS. We do not mind paying as long as it is not financially burdensome”.

Some participants recommended regulators or the professional body established an effective strategy regarding the adoption and use of GAS. However, there were mixed opinion about this recommendation. For example, a participant from a small-sized firm said: “The use of audit software has to be generated by need and regulator created policy”. However, a participant from the Big four argued:

> “There is no regulation that imposes the use of audit software on firms and it does not need to be regulated. However, it should be regulated that a big and complicated company cannot be audited by a small firm since it compromises the quality of the audit”.

Government agencies were requested to provide their opinion about the support auditors expected. It was reported Government agencies did not provide support for GAS procurement or the establishment of GAS related policy. A staff member from the PPAJP said, “We encourage audit firms to improve the quality of their results, but we do not compel them to use a specific tool”. In terms of support for GAS related training, a staff member from OJK said:

> “Training will only be given if a new regulation is released. Since we do not plan to release GAS related regulations in the future, we do not provide training.”

However, PPAJP clarified that it wished to comply with this request by considering GAS related training as part of CPD training. A staff member said:

> "We will conduct a preliminary survey of our members who are public accountants as to whether or not they need GAS training and if many members need it, then we will run it".

Furthermore, PPAJP described its support for GAS adoption and use by encouraging the establishment of the Indonesian Audit Organisations (IAO). IAO is expected to form a cooperative network of audit firms that develops GAS, arranges training and facilitates mutually beneficial relationships. This encouragement is explicitly stated in Article 33 of the *Law of Accountant Public* No 5/2011.

#### *5.4.3.4. Audit Standard Requirements or Expectations*

Previous studies indicate that professional and regulatory guidance provides strong encouragement to audit firms to use GAS (Janvrin et al., 2008b, Janvrin et al., 2009, Janvrin et al., 2008c, Brooks and Lanza, 2006, Manson et al., 1998, Debreceny et al., 2005, Bierstaker et al., 2001, Braun and Davis, 2003, O'Donnell and Schultz, 2003a, Ahmi and Kent, 2013). For example, the American Institute of Certified Public Accounting (AICPA) (2001) encourages auditors and audit firms to adopt IT and use specialists when necessary (AICPA, 2001). The Australian Auditing Standards Board also encourages auditor to use GAS to "identify unusual or unexpected revenue relationships or transactions" (AASB, 2011). However, these studies are in a developed economy setting and less likely to occur in Indonesia.

The findings of this study indicate all participants were not well-informed about the level of regulations governing GAS use in Indonesia. Participants from the Big four firms said they were not aware of regulations in Indonesia that CAATs should be used in audit". However, the Big four firms have developed CAATs in accordance with the ISA and SPAP. A participant from the Big four stated: "We use GAS not because of audit standards, but for practical considerations". However, a member of IAPI argued the use of CAATs is stated in SPAP. Although Indonesian audit standards identify CAATs (Audit Standard Statements No 59), it only introduces it and its use is optional. Audit standards are not perceived as an adoption factor for small-sized firms. A participant from a small-sized firm explained:

> "We will use GAS if there is a need, not because audit standards require us to do so. To date there is neither audit standards nor the need for us to use GAS".

*5.4.3.5 Availability of IT skilled Auditors in the Indonesian Labour Market*

Participants from the Big four and mid-tier firms raised the issue of lack of trained IT staff. A partner from a Big four firm said: "Indonesian formal education is not capable of producing ready-to-deploy human resources". The findings indicate auditors lack knowledge of IT especially among recent graduate. Participants said they need graduates were needed with a combined knowledge of accounting/auditing and IT. They proposed accounting school graduates need to be trained in audit software use. For example, knowledge about electronic data interchange and audit software training must be taught to accounting students. A partner from a mid-tier firm recommended CAATs proficiency should be tested in Indonesian CPA exams.

*5.4.3.6 Vendor of Audit Software*

The interviews found there are not any local vendors of GAS in Indonesia and this is due to the limited number of audit firms, approximately 383 firms throughout the country. This means the market for audit software is small and not attractive to local vendors. Moreover, audit software is specific and segmented hence the Big four firms have developed GAS internally or purchased it from a foreign vendor. The foreign vendor tends to charge a high price for the software that is a barrier to purchase for a small-sized firm. Moreover, the software is usually written in English and skills in this language are not always available in Indonesian audit firms.

### *5.4.4 Other Adoption Factors*

This study found the following three adoption factors less influential with participants: compatibility with the audit firm's existing IT platform, GAS complexity and foreign investment expectations within the country.

Participants considered compatibility with the audit firm's existing IT platform was less influential because the client's needs were accommodated. A participant from a Big four firm said: "All firms have to increase IT infrastructure to enable compatibility with the client". Small firms considered this factor less influential, because clients are required to provide financial data in the *MS Excel* format.

The TOE framework literature provides evidence that technological competence (Zhu et al., 2003a, Zhu and Kraemer, 2005), technological integration (Zhu et al., 2003b, Te-Ming et al.,

2005) and technological readiness (Ming-Ju and Woan-Yuh, 2008) were used to measure organisational technological compatibility and found this factor significantly influenced IT adoption. In contrast, in terms of the GAS adoption, the present study found compatibility with the existing internal IT platform is considered less important.

Participants considered GAS complexity less influential and the interviews imply only four participants considered this factor as a barrier. The remaining participants indicated if GAS offers a benefit, they would be encouraged to use it. Participants, especially from small-sized firms, regarded the expectations of foreign investors as less influential. Two participants were concerned with this factor, whereas others did not mention it. However, the World Bank released the Report on the Observance of Standards Codes (ROSC) in 2005 and 2011 recommending Indonesia improves its accounting and audit practices by implementing international accounting and auditing standards.

In summary, this study found the adoption factors can be organised into three categories: Technology, Organisation and Environment. The summary of adoption factors from existing audit and TOE framework literature by the present study can be found in Table 5.18. Table 5.18 summarizes adoption factors found in the present study and describes its contribution to existing audit and TOE framework literature. Previously identified factors from existing audit and TOE framework literature supported by this study are Fitness to Task and Firm Policy and Support. The present study also found contrasting findings and does not support associated existing literature. For example, Compatibility with Audit Firm's Existing Audit Platform factor was identified as significant to IT adoption however, the present study found it less significant. Moreover, the present study contributes to audit and TOE literature by

identifying factors not previously identified in the literature such as Language Compatibility, Regulators and/or Professional Body Level of Support and Requirements, Audit Standard Requirements and Expectations and Foreign Investment expectation within the Country.

Table 5.18 Summary of Adoption Factors from Existing Audit and TOE Framework Literature.

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| **Technological Context** | | | |
| Compatibility with audit firms' existing IT platform | - | Technology competence (Zhu et al., 2003a); (Zhu and Kraemer, 2005); (Scott, 2007)<br><br>Technology readiness (Lin and Lin, 2008) | Does not support previous TOE literature.<br><br>TOE literature indicates that technology competence or technology readiness is a significant factor however the present study found it was less significant.<br><br>In terms of GAS adoption, the present study contributes to auditing literature because other GAS-related studies do not discussed this factor. |
| Compatibility with client's existing IT platform | - | Consumer readiness (Zhu et al., 2003a); (Scott, 2007)<br><br>Trading partner readiness (Lin and Lin 2008); | Previous TOE literature provides mixed results regarding this concept. The current study found that compatibility with a client's existing IT platform was rated as a highly influential factor. Therefore, the current study partially supports previous research. |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| | | | In terms of GAS adoption, the current study contributes to auditing literature because other GAS-related studies do not discussed this factor. |
| Fitness to task | Job relevance (Ahmi and Kent 2013) | Fit to task (Dedrick & West 2003) | Supports previous audit and TOE literature.<br><br>The present study found support for fitness to task influences GAS adoption as it rated highly as an influential factor by participants. |
| Language compatibility | - | - | In terms of GAS adoption, the present study contributes to auditing literature. Moreover, since the present study was conducted in a developing economy, it contributes to TOE literature. This factor was not mentioned in audit or TOE literature. One explanation is that this study was conducted in a non-English speaking country or developing economy and GAS was developed in the English language by foreign vendors. This has caused problems for small-sized firms in Indonesia |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| | | | and therefore this factor was rated as somewhat influential. |
| GAS complexity | Difficulty in using GAS (Debreceny et al. 2005) | Complexity of IT infrastructure (Chau and Tam 1997) | Does not support previous audit and TOE literature.<br><br>Previous studies in audit or TOE literature found IT complexity is a significant aspect to GAS adoption. However, the present study found that GAS complexity is less significant to GAS adoption. |
| **Organisational Context** | | | |
| Auditor's attitudes | Attitude (Dowling 2009) | - | Supports previous audit and TOE literature.<br><br>There is no available study in TOE literature and limited studies in auditing literature that describes the user's attitude toward particular IT adoption and its use in companies. In an auditing context, Dowling (2009) found that user attitudes could be |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| | | | used to predict the intention to use an audit support system. This factor rated as highly influential by auditors hence it supports Dowling's (2009) study. |
| Firm policy and support | Firm consensus (Dowling 2009);<br><br>Facilitating conditions (Janvrin, Lowe and Bierstaker 2008);<br><br>Social influence (Curtis and Payne 2008);<br><br>Support from management (Ahmi and Kent 2013) | Top management support (Pudjianto and Hangjung 2009) | Supports previous audit and TOE literature.<br><br>The concept of a firm's policy and support has been discussed in previous studies in the auditing and TOE context and occurs in different forms. The concept positively influences technology adoption that is supported by this current study<br><br>This study found a firm's policy and support is a highly influential factor. The Big 4 and mid-tier firms confirmed that as GAS is compulsory, encouragement from audit partners is forthcoming. However, the use of GAS in small firms tends to be optional due to high acquisition cost. |
| IT capital budget | Technological and IT availability (Ahmi and | Financial resources (Zhu et al. 2003); | Supports previous audit and TOE literature. |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| | Kent 2013) | IT capital budget (Dedrick and West 2003);<br><br>Financial commitment (Zhu and Kraemer 2005) | The concept of an IT capital budget has been discussed in previous studies in the auditing and TOE context and occurred in different forms. The concept positively influences technology adoption and that is supported by this current study. |
| IT skills of auditors | IT knowledge (Al-Ansi, Bin Ismail and Al-Swidi 2013) | Perceived technical competence (Kuan and Chau 2001) | Supports previous audit and TOE literature.<br><br>The concept of an IT skill of auditors has been discussed in previous studies in the auditing and TOE context and occurred in different forms. The concept positively influences technology adoption and that is supported by this current study. |
| Learning costs | - | Switching cost (Ven and Verelst 2012) | Supports previous TOE literature.<br><br>This factor has been under-researched in auditing literature and limited studies available in TOE literature. The present study contributes to existing audit literature by defining learning costs as an |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| | | | influential factor to GAS adoption. |
| Audit approach / methodology | Audit approach (O'Donnell and Schultz 2003);<br><br>Auditing (Ahmi and Kent 2013) | - | Supports previous audit literature.<br><br>In terms of GAS adoption, the present study contributes to TOE literature by adding audit approach/methodology as an important factor. However, since this factor is audit specific, this factor may occur in a different form in other forms of IT implementation. |
| 'Champion' or CAATs/GAS experienced auditor | - | Worker experience with new platform (Dedrick and West 2003);<br><br>Boundary spanners (Ven and Verelst 2012) | Supports previous TOE literature.<br><br>This factor has been under-researched in auditing literature .The present study contributes to audit literature by adding this factor as influential to GAS adoption. |
| IT support staff | Technological and IT availability (Ahmi and Kent 2013); | IT staff time (Dedrick and West 2003); | Supports previous audit and TOE literature.<br><br>The concept of IT support staff has been discussed |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| | IT specialists (Janvrin, Bierstaker and Lowe 2008) | IS expertise (Lin and Lin 2008);<br><br>ICT expertise (Pudjianto and Hangjung 2009) | in previous studies in the auditing and TOE context and occurred in different forms. The concept positively influences technology adoption and that is supported by this current study. |
| Audit firm size | Audit firm size (Janvrin, Bierstaker and Lowe 2008, 2009); | Firm size (Zhu et al. 2003); (Zhu et al. 2003);<br><br>Size (Zhu and Kraemer 2005); Ming-Ju and Woan Yuh 2008) | Supports previous audit literature and partially supports TOE literature.<br><br>The concept of audit firm size has been discussed in previous studies in the auditing and TOE context. In auditing literature, firm size is an important factor regarding IT adoption, however in the TOE context, the result was mixed. For example, it was found in an e-business study from Europe, that firm size is a significant contributor. However, a Taiwanese study gave a different result. In the present study, audit firm size was rated as somewhat influential. Therefore, the current study partially supports previous research. |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| **Environmental Context** | | | |
| Client's needs and expectations | Complexity of client's business environment (Ahmi and Kent 2013) | Customer power (Te-Ming et al. 2005) | Supports previous audit literature and partially supports TOE literature.<br><br>TOE literature indicates that this is not an influential factor with regard to e-CRM adoption. However, auditing literature found it is influential. The present study found that this factor rated as highly influential by participants. |
| Clients' size and industry | Client size (Ahmi and Kent 2013) | Customer power (Te-Ming et al. 2005) | Partially supports previous audit and TOE literature.<br><br>The present study found there is mixed evidence about whether the clients' size is an influencing factor towards GAS use. Most participants agreed that industry characteristics are an influencing factor. This study found industries that needed to be audited by GAS are those with large data volumes from highly regulated industries. |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| Regulators and/or professional body level of support and requirements | - | Perceived government pressure (Khuan and Chau 2001);<br><br>Regulatory environment (Zhu et al. 2003); (Scott 2007); (Pudjianto and Hangjung 2009);<br><br>Regulatory support (Zhu and Kramer 2005);<br><br>Regulatory policy (Ming-Ju and Woan-Yuh 2008) | Supports previous TOE literature.<br><br>This factor has been under-researched in auditing literature. The present study demonstrates that regulators and professional body are influential organisations that can motivate audit firms to adopt GAS. The present study contributes to audit literature by adding this factor as an influential factor to GAS adoption. |
| Audit standard Requirements and expectations | Requirement by auditing standards (Ahmi and Kent 2013) | - | Supports previous audit literature.<br><br>This factor has been under-researched in TOE literature. In terms of GAS adoption, the present study contributes to TOE literature by adding audit |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| | | | standards as an important factor. However, since this factor is audit specific, it is expected in other types of IT implementation and industries that audit standards may occur in a different form. |
| Availability of IT skilled auditors in the Indonesian labor market | - | Availability of IT skilled workers (Dedrick and West 2003) | Supports previous TOE literature.<br><br>This factor has been under-researched in auditing literature. This factor was found as influential in terms of GAS adoption, and not identified in previous audit literature. Therefore, this finding contributes to audit literature. |
| Foreign investment expectations within the country | - | - | This factor has been under-researched in both auditing and TOE literature. This factor has not been found either in audit or TOE literature. However, in the Indonesian context as a developing economy, this factor was found as less influential. Therefore, this finding contributes to existing audit and TOE literature. |

| Adoption Factor | Audit Literature | TOE Literature | Note |
|---|---|---|---|
| Vendor of audit software | Adequate technical supports from vendor (Ahmi and Kent 2013) | Availability of external support services (Dedrick and West 2003) | Supports previous audit and TOE literature.<br><br>This factor has been studied in a limited context by previous studies. The findings indicate that this factor is influential to the Big 4 firms, however since audit software is specific and segmented they have developed GAS internally. Small firms tend to consider this factor as less influential because they are using *MS Excel* instead of GAS. |

Table 5.19 summarizes the adoption factors identified from interviews including definition, rationale and linkage with relevant theories, such as DoI, UTAUT and TAM (see Chapter 2). The researcher believes it is important to acknowledge other relevant theories especially DoI from which the TOE framework was originated. Moreover, some of the adoption factors that fall into the organisational category found in this study are closely related to UTAUT or TAM. The Auditors' Attitudes factor is related to perceived ease of use and usefulness from UTAUT and TAM. The Firm's Policy and support is related to social influence and facilitating condition from UTAUT. Auditor IT Skills is related to self-efficacy from UTAUT. IT Capital Budget and IT Support Staff are related to facilitating conditions from UTAUT. Furthermore, there are some adoption factors categorised from the technological and organisational paradigm consistent with aspects of DoI. For example, the factors of Compatibility with Client's Existing IT Platform, Fitness to Task and Learning Costs are related to compatibility aspects in DoI.

By identifying the linkage between adoption factors examined using the TOE framework and other relevant theories (DoI, UTAUT and TAM), this study provides support for the arguments of previous studies. Other adoption factors such as technological and organisational aspects can be explained through the TOE framework as well as DoI, UTAUT and TAM. The environmental aspect can be explained only through TOE frameworks.

Table 5.19 Adoption Factors and Its Linkage with Other Relevant Theories

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| **The Technological Context** –Audit firms, as described by the literature, must have technological competence. Technological competence includes IT infrastructure and IT human resources. Adoption factors categorised under the technological context related to the existing IT platform owned by audit firms and their clients. It includes how audit tasks can be efficiently conducted by using GAS. Factors related to the technical characteristics of GAS belong in the technological context. | | | |
| Compatibility with client's existing IT platform | Defined as the extent GAS is compatible with the client's existing IT platform. | Compatibility with the current IT platforms is a major concern for the adoption of GAS. Audit firms tend to use GAS to perform audit. | **Diffusion of Innovation (DoI):** Compatibility |
| Compatibility with audit firm's existing IT platform | Defined as the extent GAS is perceived as consistent with the existing IT platform in audit firms. | The decision to use a particular GAS product in performing audit is influenced by the IT platform implemented by the audit firm. | |
| Fitness to task | Defined as the extent the use of GAS is perceived as useful to and consistent with the auditor's work. | The decision to adopt new technology is influenced by the compatibility of the new technology with current technologies, skills and tasks (Dedrick and West, 2003). If GAS is perceived as consistent with present systems, procedures and tasks, it is more likely to be | |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| | | adopted. | |
| Language compatibility | Defined as the extent the language used in GAS is difficult to understand. | GAS is useful for completing auditing tasks however its complexity, language compatibility issues and low user friendliness of the software can be barriers to adoption. | **Diffusion of Innovation (DoI):** Complexity |
| **Organisational Context** refers to the descriptive characteristics of the organisation, including firm size and scope, complexity of managerial structure, and the quality of its human resources. | | | |
| Audit approach or methodology | Defined as the audit approach or audit methodology used by audit firms. For example, one audit firm may use an audit approach that focus on risk-based audit where other audit firms may have different focus. The audit approach or methodology is based on a comprehensive, up-to-date understanding of the client's business and industry, which is obtained through an analysis of the external and internal | The audit approach or methodology used by audit firms determines the firms' usage of GAS. | - |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| | operational environment. | | |
| Audit firm size | Categorised as the big-4, mid-tiered and small-sized audit firms. | The literature proposes that firm size and scope are important factors for technology adoption. Therefore, it is suggested that GAS use is more extensive in the Big four firms or large firms in contrast to smaller firms. | - |
| Auditor's attitudes | Defined as the auditors' willingness to use GAS and perceptions regarding its use of GAS. | Prior studies confirm that the use of a particular technology is determined by its perceived ease of use and ability to enhance job performance. This research assumes the auditor's attitude toward the use of GAS is influenced by its ease of use and improved quality of audit. | **Technology Acceptance Model (TAM),** **Unified Theory of Acceptance & Use of Technology (UTAUT):** Perceived ease |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| | | | of use<br><br>Perceived usefulness |
| 'Champion' or auditor's experience with CAATs (Computer Assisted Audit Techniques) or GAS | Defined as the availability of auditors with CAATs or GAS experience in audit firms. | The IS literature found the availability of workers experienced with new technology drives its adoption. | **Diffusion of Innovation (DoI):**<br><br>Boundary spanners |
| Firm's policy and support | Defined as the availability of support from partner or senior staff to the use of GAS. Support can be given through training, facilities and encouragement to use GAS from senior staff | Tornatzky and Fleischer (1990a) assert encouragement can expedite the process of adoption and usage of technology. Previous studies in auditing found top and senior management support was necessary to the successful adoption of GAS. This research assumes that encouragement from partners or senior staff influences GAS usage by auditors. | **Unified Theory of Acceptance & Use of Technology (UTAUT):**<br><br>Social |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| | | Furthermore, the absence of support to GAS implementation is a barrier to its use. | influence<br><br>facilitation conditions |
| IT capital budgets | Defined as the available IT budget. A large IT capital budgets enables audit firms to invest in GAS. Investment in GAS involves purchase of related hardware and software. | Literature confirms that the absence of technical infrastructure support presents barriers to usage. Large firms generally possess sufficient resources to facilitate technology implementation and usage. Ellis et al. (2000) provide evidence of IT adoption and usage in US-based public accounting firms. They investigated IT spending and usage between 1997 and 1998 and found public accounting firms made significant investment in it. | **Unified Theory of Acceptance & Use of Technology (UTAUT):**<br><br>Facilitation condition<br><br>**Diffusion of Innovation (DoI):**<br><br>Available resources |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| IT support staff | Defined as the availability of dedicated IT support staff to maintain and troubleshoot the IT infrastructure in audit firms. | IT support staff are required to support auditors in using GAS. The role of IT support staff is to maintain and troubleshoot GAS and to ensure it is used properly. | **Diffusion of Innovation (DoI):** Available resources |
| Learning costs | Defined as the cost of training for GAS that is provided by audit firms for their auditors. | The decision to adopt new technology appears to be influenced by the compatibility of the new technology with current technologies and by skills and tasks required (Dedrick and West, 2003). When an organisation wants to adopt a new technology that requires major changes, it incurs conversion costs. Klemperer (1987) classified conversion costs into three categories: transitory transaction costs (the costs involved in moving the system from one to another vendor), learning/training costs (the cost of learning to use a new system) and contractual costs (proposed by vendors to | **Diffusion of Innovation (DoI):** Compatibility |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| | | prevent the customer changing a specific service to another vendor). An auditor with experience in accounting/auditing and IT would make a valuable contribution to the process but these skills are not commonplace in the profession. In addition, schools/universities do not provide audit software training in curricula. | |
| IT skills of the auditor | Defined as the level of IT knowledge that is possessed by auditors. | It is anticipated that higher levels of auditors' IT proficiency leads to higher levels of GAS usage. | **Unified Theory of Acceptance & Use of Technology (UTAUT):**<br><br>Self-efficacy |
| **Environmental context** describes the firm's business and its dealings with trading partners, competitors and government. Pressure from business partners and/or competitors has been found to be an important factor in technology adoption. | | | |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| Audit standards requirements or expectations | Defined as the requirements and expectations for the adoption of GAS that are described in Indonesian auditing standards (SPAP) | Audit firms need to comply with Indonesian auditing standards (SPAP) that are in the process of compatible with the International auditing standard (ISA). This research seeks to examine whether GAS adoption results from influences described in SPAP or move toward international auditing standards. | - |
| Availability of IT-skilled auditors in the Indonesia | Defined as the availability of IT-skilled auditors in the Indonesian labour market. | Prior studies of IT adoption suggest that availability of skilled IT workers is an essential factor in the GAS adoption decision. Similar to previous studies, this research assumes that the auditors' IT knowledge and skills are key factors in a firm's decision to adopt GAS. | - |
| Client's needs and expectations about the audit process | Defined as the level of IT usage in a client's financial systems and how the client perceives the conduct of an audit from an IT perspective. | Iacovou et al. (1995) claims that the client's expectations is one of the critical factors towards technology adoption. It is assumed there would be similar pressure in an auditing | - |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| Client's size and industry sector | Defined as the size of the business and industry type. This may have an influence on the level of GAS usage by auditors. | environment. Large clients and those from highly regulated industries are more likely to adopt IT. | - |
| Expectations of foreign investors in the country | The expectations of foreign investors about auditing practices in Indonesia. | In 2003, the Asian Development Bank (ADB) reported the findings of the Diagnostic Study of Accounting & Auditing (DSAA). The DSAA recommended standard and practice of auditing in Indonesia needed development. This research assumes the use of GAS, as required in ISA and as recommended by foreign investors, needs to be endorsed as the Indonesian auditing standard (SPAP). | - |
| Regulators and professional body levels of support and requirements | Regulators and professional bodies may create audit related regulations and/or standards. They may also facilitate various types of support including training and advice. In term of this research, regulators are the Indonesia Financial Services | This research seeks to ascertain the extent regulator or professional body levels of support and requirements increase and enhance the use of GAS in audit practices and whether such are factors in the decision to use it. | - |

| Factor | Definition | Rationale | Relevant Theories |
|---|---|---|---|
| | Authority (OJK), Centre for Supervision of Accountants & Appraiser Services (PPAJP) and the Bank of Indonesia (BI). The Professional body is the Indonesian Institute of Certified Public Accountant (IAPI). | | |
| Vendor of audit software | Defined as a company who produces and sells audit software to audit firms. | There aren't any local vendors of GAS in Indonesia. The Big four firms have developed GAS internally or buy it from a foreign vendor. The Foreign vendor tends to charge a high price for the software. This research assumes that GAS usage would be higher if local vendors were available. Whether the availability of local vendors is an important factor is also examined. | - |

## 5.5 The Contribution of Findings from this Study into GAS Adoption Factors by Audit Firms in Indonesia to the TOE Framework Literature

This study introduces the TOE framework as part of the GAS adoption process in an external audit context in Indonesia. The results of this study contribute to TOE framework related literature and the next research question is:

*RQ3b: To what extent does the literature on the TOE framework provide insights into the adoption of GAS by audit firms in Indonesia?*

The TOE framework implies the influence of technological, organisational and environmental factors on technology adoption is spread equally (see Figure 2.4 in chapter 2). The interview data provides evidence that environmental influences are the most important to GAS adoption in the Indonesian context and is described in Figure 5.23. Specifically, client related factors such as size, industry sector, needs and expectations determine GAS adoption. Once axial coding was applied to identify the most and less dominant codes from the interview data, it was found client related codes were the most dominant. Client related codes consist of the adoption factors that describe their needs and expectations, the scale of their industry from an environmental perspective and technological compatibility with their existing IT platform.

Since audit firms in Indonesia are not well informed about the presence of GAS adoption regulatory guidance, its use tends to be determined by a client's needs. A partner from the Big four stated:

> "What drives them (audit firms) to use GAS is need and whether or not they need to use GAS is determined by the client portfolio. If the client portfolio does not use complex IT, why do we have to invest in GAS?"

A partner from a mid-tier firm confirmed this. A partner from a small firm said: "The external factors that drive our firm to invest in GAS are a client's need and if the regulator requires the use of audit software". The possibility of audit firms investing in GAS is described by a partner from a mid-tier firm who said "even though our firm is prepared to invest in GAS, the needs of our clients do not warrant it". This statement implies regulator and client related factors encourage GAS adoption and assumes organisational and technological adjustments would follow.

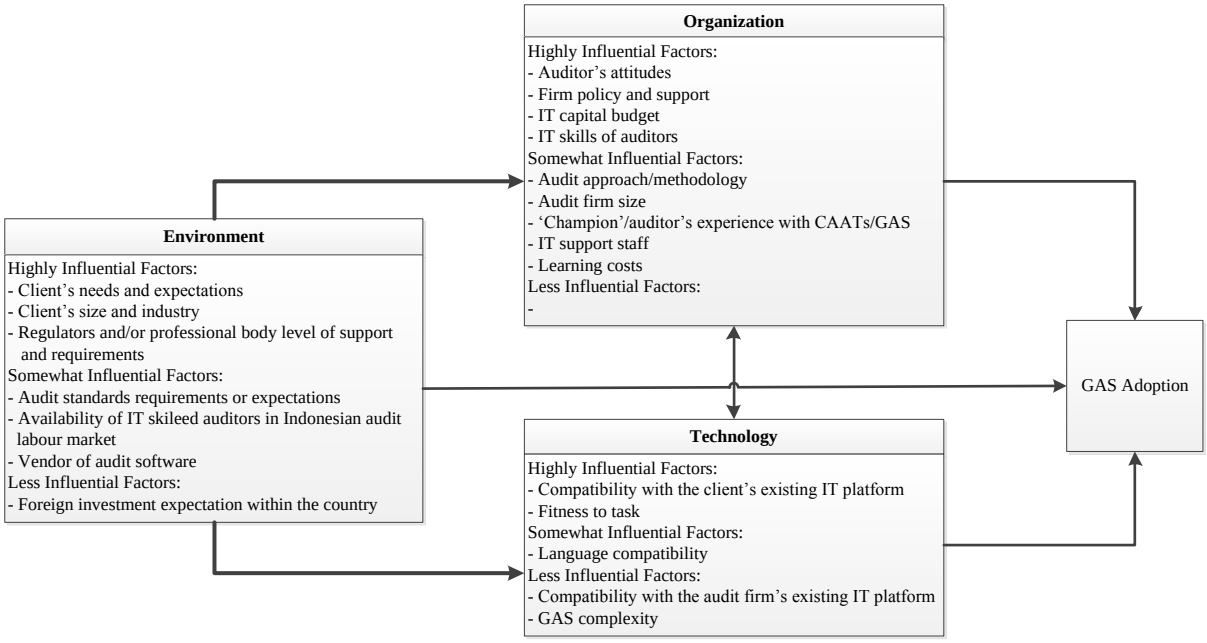


**Figure 5.23 - TOE Framework Applied to GAS Adoption in the Indonesia Context**

## 5.6 Factors Hindering Adoption and Usage of GAS in Indonesia

It was discussed previously that the adoption and use of GAS may benefit the audit process however such evidence remains limited, especially in smaller firms. Therefore, it is necessary to be informed about the factors that hinder its adoption and use in Indonesia, hence the fourth research question is:

*RQ4: What are the factors that have hindered the adoption and usage of GAS in Indonesia?*

Participants identified the following factors as inhibiting GAS adoption and use in Indonesia: lack of support from regulators and the professional accountancy body, high acquisition cost, a steep learning curve, few training opportunities, inadequate IT capital budget, absence of a 'champion' or experienced auditor and language incompatibility. Many of the hindrance factors listed above (acquisition cost, the steep learning curve and few training opportunities, inadequate IT capital budget, absence of a 'champion or experienced auditor) are consistent with those identified by previous research (Ahmi and Kent, 2013, Asgari et al., 2013, Singleton, 2006, Debreceny et al., 2005). However, two factors: lack of support from regulators and the professional accountancy body, and language incompatibility were not previously identified as significant hindrance factors. The qualitative data of inhibiting factors is summarized in Table 5.20.

Table 5.20 Inhibiting Factors

| **Category** | **Hindered Factors** | **% Participants** |
|---|---|---|
| Technology | Language compatibility | 26% |
| Organisation | Learning curve and opportunity | 44% |
| | IT capital budgets | 37% |
| | Lack of a 'champion'/experienced auditor | 33% |
| Environment | **Lack of support from regulators and professional body** | **74%** |
| | Acquisition cost of audit software | 56% |

Participants identified lack of support from regulators and the professional accountancy body as major hindrance factors. This may indicate audit firms in Indonesia are not adequately informed about GAS adoption regulatory guidelines or the availability of support from the regulator and professional accountancy body for its procurement. The participants expected regulators and the professional accountancy bodies to take the initiative and provide support

such as financial or training for GAS use. This perceived absence of support may have been due to the lack of attention by regulators and the professional accountancy body to IT implementation in audit firms. The following quote demonstrating this view was from a partner from a small firm:

> "For the last 2 or 3 years, IAPI has been busy with the adoption of IFRS[17]. IAPI has focused on IFRS and not thought about the application of technology so firms are responsible for GAS and the acquisition of technology".

The capability of audit firms to purchase GAS is partially influenced by the allocation of its IT capital budget. GAS adoption requires software and supporting IT infrastructure, such as hardware. As one partner from a mid-tier firm said:

> "I have not used audit software due to its high price, it is unaffordable and also, I have to provide a server, software, hardware upgrade and troubleshooting mechanisms."

This finding supports previous studies that found acquisition costs is a factor inhibiting audit firms purchasing GAS (Brooks and Lanza, 2006, Ahmi and Kent, 2013, Asgari et al., 2013). A partner from a mid-tier firm said, "The firm intends to use audit software but the price prevents us from using it to its full extent". Furthermore, lack of local vendor and the acquisition cost of GAS outweigh the benefits and contribute to the audit firms' unwillingness to purchase. An audit manager from a small firm expressed his opinion regarding these issues:

> "The price is high because GAS is developed by a foreign vendor; it is not worth buying if compared with the income earned from our clients".

[17] International Financial Reporting Standards

To use GAS properly, a 'champion' or experienced auditor is needed (Singleton, 2006). To create a 'champion' structured and extensive GAS related training is required. Debreceny et al. (2005), found the difficulty in using GAS contributes to its limited use and furthermore, Janvrin et al. (2008b) recommended auditors need more IT education and or training to improve their IT confidence. The current study found lack of a 'champion' or experienced auditor, the steep learning curve and insufficient training are factors inhibiting audit firms adopting and using GAS. A partner from a Big four firm explained these factors:

> "This relates to human resources, smaller firms do not have sufficient recruitment procedures to hire auditors with IT qualifications and adequate training to enable the use of GAS".

This statement implies it will be more difficult for smaller firms to find a 'champion' than larger firms, and this is consistent with the findings of previous studies. Larger firms have more resources to train an IT-skilled auditor (Palmrose, 1986, Janvrin et al., 2008b).

The steep learning curve and lack of training opportunities were commented upon by a partner from a small audit firm: "Not every auditor is willing to be trained in using audit software and it is time consuming to learn". This statement is understandable as GAS proficiency takes time. Auditors need supporting IT knowledge such as database search and retrieval[18] and database design and installation knowledge[19]. A manager from a Big four firm compared the learning curve among auditors:

> "During the early stages, employees who have an accounting background take longer to use GAS, but later on they will be as skilled as the ones with an IT background".

[18] "Software that uses relational structures between data files and facilitates varying data retrieval and use" IFAC 2003. International Education Guideline 11: Information Technology for Professional Accountants. *In:* COMMITTEE, E. (ed.).
[19] "Software that permits the creation and use of relational structures between data files" ibid.

The final barrier is language incompatibility. As discussed in the previous section about vendors of audit software, this study found there are few, if any, local vendors of GAS in Indonesia. As the software is usually written in English, it creates problem since fluency in English is not always present especially in smaller audit firms. A partner from a mid-tiered firm explained: "Not all my auditing staff speaks English well. The terminology used in GAS is in English". Unlike neighboring countries such as Malaysia or Singapore, Bahasa is spoken for most transactions. This is a problem as most commercially available GAS comes from foreign vendors hence the software menus and instruction manuals are in English. Moreover, once a firm intends to purchase GAS it needs to establish business communication in English with the vendors. Limited language compatibility contributes to the slower up take of GAS in Indonesia.

Language incompatibility was one barrier described by participants in this study yet it is not discussed in CAATs or GAS related literature and has only been identified in IT related literature in a limited sense. This is understandable as most previous studies were conducted in developed economies, especially English-speaking countries. However, in the IT literature there are a few relevant examples, for instance, Bagayoko et al. (2010) found English can be a challenge in hospital information system (HIS) implementation in Mali as this country is French-speaking. Closer to the study environment, Soekarno et al. (2009) found a low level of English proficiency of the Indonesian workforce inhibits technology transfer in the turbine maintenance and overhaul industry. They investigated different types of technology adoption, hospital information systems and technology in the aircraft industry, and their findings confirmed lack of English proficiency is a barrier to technology adoption. This finding can be applied to GAS adoption in non-native English-speaking countries, especially developing economies.

## 5.7 Conclusion

The use of GAS by auditors in Indonesia was relatively low even though it has been prescribed in ISA. For example, the use of internally developed software in mid-tier firms was less than 50% and there was little evidence small-sized firms used it. However, the use of commercially available software (*ACL* or *IDEA*) in mid-tier firms was similar to the Big four firms, although very low usage was recorded in small-sized firms. Interestingly, 61% of participating audit firms are internationally affiliated and yet only 44% of firms used GAS. This implies international affiliation does not always provide Indonesian audit firms with adequate motivation or resources to adopt GAS. Even though this result needs to be studied further the interviews imply that affiliation does not necessarily lead to increased technology or competency.

The current study found competitiveness, improved efficiency, increased audit quality, increased productivity and uniformity were identified as benefits from GAS use. Participants from firms of disparate size were interviewed for this study and as expected, different opinions were recorded and benefits were varied. For example, perceptions were mixed about the competitiveness of a firm, increased audit quality and uniformity as benefits of GAS use. However, all participants agreed GAS use was expected to improve efficiency and audit productivity.

By using the TOE framework this study found 21 adoption factors had an impact on the adoption of GAS in the Indonesian context (Table 5.17). Ten factors were rated as highly

influential by most external auditors (Table 5.16). In addition, eight adoption factors were rated as somewhat influential to their decision and three other factors from the TOE framework were rated as of limited influence. The factors that contribute to audit and TOE literature are shown in Table 5.18. Interestingly, the factors of language compatibility and foreign investment expectations were found significant to Indonesia. These factors were not previously found important in either GAS-related or TOE literature. This suggests Western-based studies in auditing are not always applicable to a developing economy. Another difference found by this study is the technological, organisational and environmental elements do not exert equal influence or weight on the decision to adopt IT or GAS as implied by the TOE framework in the Indonesian context. Findings indicate environmental influences are the most important with regard to GAS adoption and use.

This study identified six hindrance factors to adoption and use of GAS. They consist of one technological, three organisational and two environmental hindrance factors (Table 5.20). The factors are lack of support from regulators and the professional accountancy body, high acquisition cost of GAS, steep learning curves and limited learning opportunities, inadequate IT capital budget, lack of a 'champion' or experienced auditor and language incompatibility. Many of the hindrance factors listed above are consistent with those identified by previous research. However, lack of support from regulators and the professional accountancy bodies, and language incompatibility had not been identified previously as significant hindrance factors. The lack of support from regulators and the professional accountancy bodies was identified as a major hindrance to GAS adoption and use, followed by the high acquisition cost of GAS. These two factors are listed in the environmental category of the TOE framework. This finding supports Research Question 3b regarding the special significance of

the environmental aspect to GAS adoption and use in Indonesia in comparison with technological and organisational elements.

# CHAPTER 6 – CONCLUSION

## 6.1 Introduction

This study examined the adoption and use of GAS in Indonesia. It consists of a series of 34 interviews with external auditors and other stakeholders. The purposes of the interviews were to understand GAS use, to obtain knowledge about its benefits and to gain information about adoption and hindrances. The TOE framework was used as a lens through which to investigate GAS adoption and hindered factors. The study contributes to existing GAS and TOE framework related literature in the context of a developing economy.

This chapter begins with a summary of the study findings. The study's implications and limitations are described and recommendations have been suggested for future research. The next section describes the study's implications to the body of knowledge and acknowledges limitations found during the research process. This study aims to bridge theoretical gaps in auditing research about factors driving GAS adoption, and suggests recommendations for further and related investigations.

## 6.2 Summary of the Findings

The main purpose of this study was to investigate the adoption and use of Generalized Audit Software (GAS) by Indonesian audit firms. It investigated the current use of GAS by external auditors, identified their perceptions about its limitations and benefits and specified adoption and hindrance factors. The following are the research questions of the study:

1. What form of GAS is used by Indonesian audit firms and the context of its use?

2. To what extent do Indonesian external auditors believe GAS use provides benefits that improve the quality of an audit process?
3. What factors lead to increased adoption of GAS in Indonesia?
4. To what extent does the literature on the TOE framework provide insights into GAS adoption in Indonesia?
5. What are the factors hindering the adoption and use of GAS in Indonesia?

This study found that GAS use was new to audit practice in Indonesia but all participants were aware of its potential benefits. However their perceptions of what GAS means were varied. Some participants, especially those from mid-tier and small-sized firms, defined specific *MS Excel* applications, such as random sampling as GAS and this was sufficient GAS for their audit purposes. This finding is confirmed by the high rate of *MS Excel* use reported in Table 5.13 (Chapter 5). There was limited use made of commercially available software (e.g. *ACL* or *IDEA*) across the sample. Larger firms tended to use GAS for a variety of audit procedures and were likely to use their own internally developed software to supplement commercially available applications (Table 5.15 in Chapter 5).

The present study identified the benefits of GAS use as well as barrier to use. The current study found that competitiveness, improved efficiency, assured audit quality, increased audit productivity and audit uniformity were perceived as benefits from GAS use. However, since this study interviewed participants from firms of all sizes, different opinions were recorded hence the identified benefits varied. For example, participants' perceptions about the impact of competitiveness of a firm and assured audit quality and uniformity as benefits of GAS were mixed. However, participants agreed that improved efficiency and increased audit

productivity could be achieved through GAS use. Barrier factors outweighed the benefits for many firms, especially small ones, and therefore GAS use was limited.

To understand of the limited use of GAS, this study applied the TOE framework. Through the interviews the researcher obtained the opinions participants of GAS adoption and use. The study identified 21 adoption factors that had an impact on the use of GAS in the Indonesian context (Appendix 5). Ten of these factors were rated as highly influential by most external auditors, such as fitness to task, IT capital budget and client's needs and expectations (Table 5.16 in Chapter 5). In addition, eight adoption factors were rated as somewhat influential to their decision, such as language compatibility, audit firm's size and vendor of audit software (Table 5.17 in Chapter 5). Three other factors from the TOE framework were rated as of limited influence, such as compatibility with audit firm's existing IT platform and foreign investment expectations in the country. The contribution made from the results of this study to the TOE framework is the identification of several new GAS adoption factors such as language compatibility and environmental influences on GAS adoption and use in a developing country situation such as Indonesia. The TOE framework assumes that all major factors have equal influence however the present study identified the environment aspect as having the dominant role. The researcher believes the identification of this factor is the main contribution the study makes to the body of literature.

This study identifies GAS use by the Big four is considered essential to compliance with their firm's global audit methodology. Conversely, only a few participants from mid-tier firms identified the importance of audit methodology and small sized firms did not consider this factor as significant.

This study identifies 6 hindrance factors to the adoption and use of GAS, that are 1 technological, 3 organisational and 2 environmental (Table 5.20 in Chapter 5). The factors are lack of support from regulators and the professional accountancy body, the high acquisition cost of GAS, the steep learning curves and limited training opportunities, inadequate IT capital budget, absence of a 'champion' or experienced auditor and language incompatibility. Many of the hindrance factors listed above are consistent with those identified by previous research. However, two factors, lack of support from regulators and the professional accountancy body, and language incompatibility had not been previously identified as significant hindrance factors. A perceived lack of support from regulators and the professional accountancy body were also identified as major hindrances to GAS adoption and use, followed by high acquisition cost of GAS. Under the TOE framework, these two factors would be considered as part of the environmental category. Identification of environmental factors as a condition of GAS adoption and the discovery of two new factors mentioned above, are the contributions this study makes to the TOE framework and GAS research.

## 6.3 Implications

This study contributes to existing auditing and TOE literature in several ways. It provides new insights into GAS adoption and use in the external audit setting in firms of all sizes in a developing economy. Previous studies focus on developed economies but there is a lack of investigation in this issue in developing economy context and this research therefore contributes to and increases the knowledge base.

The empirical context includes the examination of GAS adoption and use in the developing Indonesian economy. The research methods used to collect and validate the data are

interview, archival record and secondary evidence. As mentioned previously, the researcher interviewed external auditors from different sized firms, staff members from Government agencies (PPAJP and OJK) and a staff member of professional accountancy body (IAPI). Most previous CAATs/GAS related studies rely on a survey-based approach that is unable to elicit the same depth of understanding about the subject. Interview-based studies in the past such as Debreceny et al. (2005) and Dowling and Leech (2007) were conducted with a small number of participants and focused predominantly on a specific industry, such as the banking industry or large firms. Moreover, previous studies included interviews with participants from audit firms or their clients but did not include participants from Government agencies or the professional accountancy body. This study provides a more balanced opinion through interviewing representatives from these other areas.

This study introduced the Technology, Organisation and Environment (TOE) Framework as a lens through which to explore the GAS adoption process. The focus of previous research has been restricted to individual adoption factors and used UTAUT or TAM to underpin the research. By using the TOE framework, the researcher has gained insights into individual factors and also into technological, environmental, organisational adoption factors. The identification of adoption and hindrance factors contributes to audit and TOE literature (Table 5.18 in Chapter 5). For example, the adoption factors of language compatibility and foreign investment expectations within the country contribute to both audit and TOE literature. These factors have not been found in either GAS-related or TOE literature. In terms of hindrance factors, the lack of support from regulators and the professional accountancy body, and language incompatibility were not previously identified as significant hindrance factors in existing literature. Therefore, this positions the findings of this study in its developing economy context as unique.

Moreover, in terms of its theoretical contribution, this study found that in the Indonesian context, the technological, organisational and environmental factors do not influence IT or GAS adoption equally as implied by the TOE framework. The findings indicated that environmental influences are the most important with regard to GAS adoption and use in the Indonesian context. This study found that client and regulator related factors are the most influential factors to GAS adoption and use. This means client and regulators related factors encourage GAS adoption and assumes organisational and technological adjustments would follow.

## 6.4 Limitations of the Study

This study has four main limitations. Firstly, this study focused on the adoption and use of GAS of all types. These software packages can be commercially available or internally developed. Since GAS is relatively new in the Indonesian auditing context, it was important to investigate all types of this software, to gain an understanding about the level of use. The adoption and hindrance factors found by this study were applied across all types of GAS equally which may be too general.

Secondly, the findings of this study are based on a limited number of participants from one country and it is possible this could reduce its wider application. Moreover, most participants were partners in audit firms. This study makes an assumption that GAS adoption is the firm's decision rather than that of the individual auditor. Consequently, the research allocates less discussion to the practical/technical aspects of GAS use because it was reasonable to assume the firm's partner(s) made the decision to invest in it. To that end, more partners were

interviewed than senior or junior auditors and the findings and discussion therefore place more weight on the opinion of management.

Thirdly, this study seeks information about auditors' perceptions and experiences of GAS use. Interpretive research is used to understand the phenomenon that is being used in the context of this study. In this study, interpretation is based on the TOE framework, previous literature, archival records and secondary evidence. However, as interpretation is subjective being based on opinions, assumptions and values of the researcher. Fourthly, one needs to recognize the inherent imperfections of the interview process. Data may be subject to bias due to participants adjusting their responses to reflect what they think is socially desirable or what the researcher needs. Chapter 4 discussed the process used to maintain the validity of this study including methods employed to reducing researcher and participant bias.

## 6.5 Suggestions for Future Research

This study attempts to bridge some gaps in the GAS auditing literature such as the lack of evidence from and about developing countries and limited research using TOE framework. Future research could break GAS use down into two major sub-components such as commercially available and internally developed. This would enable a more in-depth examination of the complexities of computer software use.

Furthermore, future research could focus more on junior auditors rather than partners as this group use GAS more extensively than their managers. Furthermore, the findings of this study could form the basis for a survey-based approach to GAS use in order to increase the wider application of the findings. Research into the use of GAS in internal audit settings would also

supplement the work on external audits. There is a need to investigate whether GAS use is more or less prevalent in such an internal context and to explore the reasons.

As the study is based on perceptions of auditors and other key stakeholders about GAS, future research could seek to examine direct relationship, if any, about GAS use and factors such as audit quality. This study recorded mixed results regarding perceptions of improved audit quality as a benefit of GAS use. Small-sized firms were less convinced with this possible benefit. There are many proxies that can be used to measure audit quality, such as discretionary accruals. This study found some evidence to indicate participants generally felt GAS use enhances audit quality due to its ability to increase the accuracy of analysis and the completeness of audit procedures. Future research could examine the relationship, if any, between GAS use and measures of audit quality such as discretionary accruals.

This study found that international affiliation does not always provide audit firms with motivation to invest in IT or GAS in particular. Future research could investigate whether international affiliation leads to increased technological competencies. Another aspect needing further research is concerned with improved audit capabilities of audit firms as an outcome of international affiliation. Given the findings of this study, this perceived benefit from international affiliation may not occur in practice. Future research into client's GAS use and audit fees is also another unexplored area for future research.

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## APPENDICES

### Appendix 1 Previous CAATs and GAS-related Studies

| Author(s) And Year | Country | Focus And CAATs Type | Size of Auditing Firm | Method | Theory / Framework / Model | Key Findings |
|---|---|---|---|---|---|---|
| Lovata<br><br>(1988a) | USA | External Auditor:<br>- Audit manager<br>- EDP auditor<br><br>GAS | Big 8 | Quantitative – Survey | Davis and Weber Model of Stress and the Systems Hierarchy<br><br>Cushing and Loebecke Structure / Technology Distinctions. | Environmental situations appear to influence GAS usage.<br><br>The biggest benefit derived from GAS usage is increased efficiency.<br><br>Audit managers tend to identify cost and implementation problems more often than the EDP auditors. |
| Lovata<br><br>(1990) | USA | External Auditor<br><br>Unspecified CAATs | Big 8 | Quantitative – Survey | Cushing and Loebecke Structure / Technology Distinctions. | Low structured firms tend to use CAATs the most, followed by high structured then medium structured firms.<br><br>The most often used CAATs is generalized audit software. |
| Bierstaker et | USA | IT Professionals | Big 5 | Qualitative – | - | Technology is already having a major |

| Author(s) And Year | Country | Focus And CAATs Type | Size of Auditing Firm | Method | Theory / Framework / Model | Key Findings |
|---|---|---|---|---|---|---|
| al.<br><br>(2001) | | Unspecified CAATs | | Interview & Observation | | impact on audit planning, information sharing, audit testing and audit documentation. |
| Banker et al.<br><br>(2002) | USA | MIS Staff External Auditor<br><br>Unspecified CAATs | Big 5 | Mixed – Interview & Secondary data | Task-technology Fit | IT has different impacts on auditors on different ranks. The impacts are all in the positive direction.<br><br>The results from quantitative method indicated that there is a significant productivity improvement after the adoption of IT. |
| Bedard et al<br><br>(2003) | USA | Senior/staff Auditors (Workpaper preparers)<br><br>Electronic workpaper system | International audit firm | Quantitative – Survey | Technology Acceptance Model | Training is associated with shifts in preparers' perceptions of their task and computer self-efficacy, but those reviewers' self-perceptions did not change on average.<br><br>For both groups (preparers and reviewers), increases in computer self-efficacy are positively associated with shifts in system ease of use perceptions, and increase in preparers' task self-efficacy are also positively associated with shifts in their ease of use perceptions. |

| Author(s) And Year | Country | Focus And CAATs Type | Size of Auditing Firm | Method | Theory / Framework / Model | Key Findings |
|---|---|---|---|---|---|---|
| | | | | | | These results imply that an important mechanism through which training improves systems acceptance is through its effect on users' views of both their task and computer self-efficacy. |
| Braun & Davis<br><br>(2003) | USA | External Auditor<br><br>GAS: Commercially available software | Government | Quantitative – Internet survey | - | Audit Command Language (ACL) software provides an ability to improve both effectiveness and efficiency.<br><br>Auditors have not uncovered all of the benefits that the software has to offer.<br><br>Documentation practices of auditors using ACL are in need of improvement. |
| O'Donnell & Schultz<br><br>(2003b) | USA | Senior External Auditor<br><br>Audit support software | Audit firms from all sizes | Quantitative – Survey | - | Findings indicate senior auditors who were accustomed to using Transaction-cycle-focused (TCF) software identified more risk factors when client information was presented in a Business-process-focused (BPF) presentation format than in a TCF presentation format. |

| Author(s) And Year | Country | Focus And CAATs Type | Size of Auditing Firm | Method | Theory / Framework / Model | Key Findings |
|---|---|---|---|---|---|---|
| Debreceny et al.<br><br>(2005) | Singapore | Internal Auditor and External Auditor of Financial Institutions<br><br>GAS: commercially available software and internally developed software | Local auditing firms | Qualitative – In-depth interview | - | The extent and range of use of GAS varies widely between the institutions in the sample.<br><br>GAS is being used for special investigation audit.<br><br>The difficulty in using GAS and the usage of GAS for special investigation are the reason for the limited usage of GAS. |
| Mahzan & Lymer<br><br>(2008) | UK | Internal Auditor<br><br>Unspecified CAATs | - | Mixed – Survey & In-depth interview | UTAUT | This study develops the model of successful adoption of CAATs. There are four dimensions in this model, which are (1) motivation for CAATs adoption, (2) best practices for implementation, (3) challenges faced in the adoption process and (4) method for performance evaluation. |
| Dowling & Leech | Australia | Partners Audit Managers | Five international audit firms: | Qualitative – Interview | - | The participants design their audit support systems to enforce compliance with their firm's audit methodology. |

| Author(s) And Year | Country | Focus And CAATs Type | Size of Auditing Firm | Method | Theory / Framework / Model | Key Findings |
|---|---|---|---|---|---|---|
| (2007) | | Audit support systems | Big four & 1 large mid-tier international audit firm | | | The partners also identified that audit support systems can enhance audit quality through promoting compliance with accounting standards and the firm's methodology. |
| Curtis & Payne<br><br>(2008) | USA | External Auditor<br><br>Unspecified CAATs | Big four | Quantitative – Case study & Questionnaire | UTAUT | Firms have the ability to influence the implementation of new technology by using longer-term budget and evaluation periods and by communicating the approval of remote superiors regarding the software. |
| Janvrin et al.<br><br>(2008d) | USA | External Auditor<br><br>Unspecified CAATs | Big four National Regional & Local Firms | Quantitative – Survey | - | Auditors extensively use a variety of audit applications including analytical procedures, audit report writing, electronic working papers, internet search tools and sampling.<br><br>Auditors perceive several applications as important (e.g., fraud review).<br><br>IT specialists use is infrequent.<br><br>Audit IT use and perceived importance vary by firm size. |

| Author(s) And Year | Country | Focus And CAATs Type | Size of Auditing Firm | Method | Theory / Framework / Model | Key Findings |
|---|---|---|---|---|---|---|
| Janvrin et al.<br><br>(2008f) | USA | External Auditor<br><br>Unspecified CAATs | Big four<br>National<br>Regional & Local Firms | Quantitative – Survey | UTAUT | Factors of "performance expectancy" and "facilitating conditions" such as organisational and technical infrastructure support influence the likelihood that auditors will use CAATs.<br><br>To increase CAATs usage, audit firm management may want to develop training programs to increase auditors' degree of ease associated with using CAATs.<br><br>Audit firm management may want to enhance their organisational and computer technical support for CAATs to encourage their usage. |
| Dowling<br><br>(2009) | Australia | External Auditor<br><br>Audit support systems | The six largest international audit firms | Quantitative – Survey | Adaptive Structuration Theory<br><br>Theory of Planned Behavior | Intention to use the system appropriately and external control increase appropriate use.<br><br>Audit support system restrictiveness and the effectiveness of the audit process are antecedents of external control. |

| Author(s) And Year | Country | Focus And CAATs Type | Size of Auditing Firm | Method | Theory / Framework / Model | Key Findings |
|---|---|---|---|---|---|---|
| | | | | | | Team and firm consensus on appropriation are antecedents of perceived normative pressure, which, along with an auditor's attitude and self-efficacy, influence an auditor's intention to use the system appropriately. |
| Janvrin et al. (2009) | USA | External Auditor Unspecified CAATs | Big four National Regional & Local Firms | Quantitative – Survey | - | Computer-related audit procedures are generally used when obtaining an understanding of the client system and business processes and testing computer controls. |
| Kim et al. (2009) | USA | Internal Auditor GAS | - | Quantitative – Internet Survey | Technology Acceptance Model | The technology features were accepted by internal auditors in different ways. The basic features such as database queries, ratio analysis, and audit sampling were more accepted by internal auditors while the advanced features such as digital analysis, regression/ANOVA, and classification are less accepted by internal auditors. |
| Ahmi & Kent (2013) | UK | External Auditor GAS | Small and Medium-sized Audit | Quantitative – Web-based Survey | - | About 73 per cent of external auditors make no use of GAS, due to the perceived limited benefit of using GAS |

| Author(s) And Year | Country | Focus And CAATs Type | Size of Auditing Firm | Method | Theory / Framework / Model | Key Findings |
|---|---|---|---|---|---|---|
| | | | Firms | | | for auditing small clients.<br><br>Some respondents recognized the advantages of GAS, but they make no use of it because of the high implementation costs, significant learning curve and adoption process, and lack of ease of use. They prefer to use traditional manual auditing methods instead. |

**Appendix 2 TOE-related Studies**

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| Chau and Tam (1997)<br><br>Hong Kong | Open Systems | *Dependent variable*<br>IT innovation decision making<br><br>*Independent variables*<br>External environment:<br>- Market uncertainty<br><br>Characteristics of the "open systems technology" innovation:<br>- Perceived benefits<br>- Perceived barriers<br>- Perceived importance to standards, | Interview<br><br>11 directors/vice president of IS<br>64 managers / section-heads of IS<br>14 non-IS titles, such as financial controller or engineering manager | - | The relationship between market uncertainty and open systems adoption was found to be insignificant.<br><br>Perceived benefits of adopting open systems were found to be insignificant.<br><br>Perceived barriers to adopting open systems were found to be significant.<br><br>There was a moderate support for the positive |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | interoperability, and interconnectivity<br><br>Organisational technology:<br>- Complexity of IT infrastructure<br>- Satisfaction with existing systems<br>- Formalization on system development and management | | | relationship between the perceived importance to standards, interoperability and interconnectivity and open systems adoption.<br><br>There was a negative relationship between satisfaction level with current systems and open systems adoption.<br><br>The study did not find a significant relationship between complexity of IT infrastructure and the likelihood to adopt open systems. |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | | | | The results also do not show any significant influence of the degree of formalization of systems development and management on open systems adoption. |
| Kuan and Chau (2001)<br><br>Hong Kong | Electronic Data Interchange (EDI) | *Dependent variable*<br>EDI adoption<br><br>*Independent variables*<br>Technological context:<br>- Perceived direct benefits<br>- Perceived indirect benefits<br><br>Organisational context: | Survey<br><br>Total: 575 senior executive from small companies, consists of:<br>- 263 adopter firms<br>- 312 non adopter firms | Iacovou et al. (1995)'s models | Perceived direct benefits were significant in EDI adoption for small business. Compared with non-adopter firms, EDI was perceived higher by adopter firms.<br><br>Perceived indirect benefits were not found to be significant in distinguishing adopter firms from non- |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | - Perceived financial control<br>- Perceived technical competence<br><br>Environmental context:<br>- Perceived industry pressure<br>- Perceived government pressure | | | adopter firms.<br><br>Perceived financial costs were significantly distinguishing adopter firms from non-adopter firms in the case of small business. Adopter firms perceived financial costs less as an obstacle than non-adopter firms did.<br><br>Adopter firms had a better perception of their internal technical competence than non-adopter firms did. Compared with adopter firms, non-adopter firms |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | | | | perceived themselves not have the necessary technical resources to support EDI.<br><br>Adopter firms perceived significantly lower pressures from the industry than non-adopter did.<br><br>Adopter firms perceived higher pressure from the government than non-adopter did. |
| Dedrick and West (2003)<br><br>The US | Open Source Software | - | Semi-structured in-depth interview<br><br>15 MIS managers | - | Technology:<br>- Hardware cost<br>- Software cost<br>- Reliability<br>- Availability of 3rd party |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | | | | apps<br>- Portability of own apps<br>- Skills of existing IT workers<br>- Fit to task<br>- Difficulty in administration<br>- Ease of experimenting<br><br>Organisation:<br>- IT capital budget<br>- IT staff time<br>- Innovativeness of IT organisation<br>- Worker experience with new platform<br><br>Environment: |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | | | | - Industry maturity<br>- Availability of skilled IT workers<br>- Availability of external support services<br>- Platform long-term viability |
| Zhu et al. (2003a)<br><br>Europe | E-Business | *Dependent variable*<br>Intention to adopt<br><br>*Independent variables*<br>Technological context:<br>- Technology competence (IT infrastructure, Internet skills, E-business know-how)<br><br>Organisational context: | Survey<br><br>Total: 3552 respondents, consist of:<br>501 – Germany<br>501 – UK<br>361 – Denmark<br>374 – Ireland<br>501 – France<br>500 – Spain<br>506 – Italy | - | Technology competence, firm scope and size, consumer readiness, and competitive pressure are significant adoption drivers, while lack of trading partner readiness is a significant adoption inhibitor.<br><br>As e-business-intensity increases, two environmental |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | - Firm scope<br>- Firm size<br><br>Environmental context:<br>- Consumer readiness<br>- Competitive pressure<br>- Lack of trading partner readiness<br><br>*Control variables*<br>- Industry effect<br>- Country effect | 308 - Finland | | factors, which are trading partner readiness become less important, and competitive pressure remains significant. |
| Zhu et al. (2003b)<br><br>10 countries: Brazil, | E-Business | *Dependent variables*<br>E-Business value (Impact on commerce, Impact on internal efficiency, Impact on coordination). | Survey<br><br>612 responses from financial firms across 10 countries | - | Technology integration emerges as the strongest factor for e-business value, while financial resources, firm scope, and regulatory environment also |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| China, Denmark, France, Germany, Japan, Mexico, Singapore, Taiwan and the US | | *Independent variables*<br>Technological context:<br>- Technology integration<br><br>Organisational context:<br>- Firm size<br>- Firm scope<br>- Financial resources<br><br>Environmental context:<br>- Competition intensity<br>- Regulatory environment | | | significantly contribute to e-business value.<br><br>Firm size is negatively related to e-business value.<br><br>Competitive pressure often drives firms to adopt e-business, but e-business value originates more firm internal organisation resources than from external pressure.<br><br>Government regulation plays a much more important role in developing countries than in developed countries. |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| Te-Ming et al. (2005)<br><br>Taiwan | e-CRM | *Dependent variable*<br>e-CRM performance (Customer loyalty, Internal process efficiency, Channel management, Innovation)<br><br>*Independent variables*<br>Technological context:<br>- e-CRM technology integration<br>- Customer information analysis<br><br>Organisational context:<br>- e-CRM personnel asset<br>- Learning and sensing customer market<br>- Customer knowledge | Survey<br><br>136 respondents who mainly are marketing and sales managers or customer relationship directors. | - | Customer loyalty, internal process efficiency, channel management and innovation sufficiently account for the e-CRM performance.<br><br>Environmental pressure in the industry does not impact the e-CRM performance.<br><br>e-CRM technology integration and customer information analysis sufficiently account for the e-CRM technology<br><br>e-CRM personnel assets, learning and sensing |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | management<br><br>Environmental context:<br>- Competition intensity<br>- Customer power | | | customer market, and customer knowledge management sufficiently account for the organisational support on e-CRM<br><br>Competition intensity and customer power sufficiently account for the environmental pressure on e-CRM.<br><br>Organisational construct has the most positively significant impact on e-CRM performance. Technology construct is also positively |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | | | | related to e-CRM performance. However, the environmental construct is not significantly related to the performance. |
| Zhu and Kraemer (2005)<br><br>10 countries: Brazil, China, Denmark, France, Germany, Japan, Mexico, | E-Business | **TOE Framework**<br>*Dependent variable*<br>E-Business use<br><br>*Independent variables*<br>Technological context:<br>- Technology competence<br><br>Organisational context:<br>- Size<br>- International scope<br>- Financial commitment | Survey<br><br>Total: 624 respondents, consist of:<br>64 – Brazil<br>64 – China<br>47 – Denmark<br>61 – France<br>60 – Germany<br>53 – Japan<br>69 – Mexico<br>57 – Singapore<br>63 – Taiwan (China) | Resource-Based Theory | Technology competence, firm size, financial commitment, competitive pressure, and regulatory support are important antecedents of e-business use.<br><br>While both front-end and back-end capabilities contribute to e-business value, back-end integration has a much stronger impact. |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| Singapore, Taiwan and the US | | Environmental context:<br>- Competitive pressure<br>- Regulatory support<br><br>**RBV Theory**<br>*Dependent variable*<br>E-Business value (Impact on sales, Impact on internal operation, Impact on procurement)<br><br>*Independent variables*<br>- E-Business use<br>- Front-end functionality<br>- Back-end integration | 86 – the US | | |
| Lin and Lin (2008) | E-Business | *Dependent variable*<br>E-Business diffusion (Internal integration, | Survey<br><br>163 respondents who were | - | IS infrastructure, IS expertise, expected benefits of e-business, and |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| Taiwan | | External diffusion)<br><br>*Independent variables*<br>Technological context:<br>- IS infrastructure<br>- IS expertise<br><br>Organisational context:<br>- Organisational compatibility<br>- Expected benefits of e-business<br><br>Environmental context:<br>- Competitive pressure<br>- Trading partner readiness | CIO, CTO or IS executives | | competitive pressure are important factors shaping e-business diffusion. |
| Scott | Digital | *Dependent variable* | Not specified | - | Competitive pressures and |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| (2007)<br><br>The US | transformation in the aviation industry | e-Transformation<br><br>*Independent variables*<br>Technological context:<br>- IT infrastructure competence<br>- E-business know-how<br><br>Organisational context:<br>- Organisational culture<br>- Organisational change<br><br>Environmental context:<br>- Competitive pressure<br>- Customer readiness<br>- Regulatory environment | | | improving technological competence and e-business know-how have driven the aviation industry to start adopting technology.<br><br>Challenges to adopt digital technology include developing the IT infrastructure, optimizing new digital processes and cultural transformation. |
| Ming-Ju and Woan- | ERP | *Dependent variable*<br>ERP adoption | Survey<br>Face to face interviews | - | Technology readiness, size, perceived barriers and |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| Yuh (2008)<br><br>Taiwan | | *Independent variables*<br>Technological context:<br>- IT infrastructure<br>- Technology readiness<br><br>Organisational context:<br>- Size<br>- Perceived barriers<br><br>Environmental context:<br>- Production and operations improvement<br>- Enhancement of products and services<br>- Competitive pressure<br>- Regulatory policy | were conducted to ensure the validity of the responses.<br><br>99 respondents from communication industry. | | production and operations improvements are found to be important determinants of the adoption of ERP. |
| Pudjianto | e-government | *Dependent variable* | Survey | - | IT infrastructure did not play |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| and Hangjung (2009)<br><br>Developing Countries | | e-government assimilation<br><br>*Independent variables:*<br>Technological context:<br>- ICT expertise<br>- ICT infrastructure<br><br>Organisational context:<br>- Top management support<br>- Organisational compatibility<br>- Extent of coordination<br><br>Environmental context:<br>- Regulatory environment<br>- Competition | 28 University students who came from 16 developing countries and were a government officer in their countries. | | an importance influence on e-government assimilation.<br><br>Top management support and regulatory environment are significant factors to e-government assimilation. |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | environment | | | |
| Ven and Verelst (2012)<br><br>Belgium | Open Source Server Software | - | Semi-structured in-depth interview<br><br>Informants from 10 Flemish organisations, consist of the following sectors:<br>- Audit, video and telecommunications<br>- Machinery and equipment<br>- Telecommunications<br>- Publishing and printings<br>- Food products and beverages<br>- Research and | - | Adoption factors identified from interviews:<br>Technological context:<br>- Software cost<br>- Switching cost<br>- Reliability<br>- Trialability<br>- Source code availability<br><br>Organisational context:<br>- Boundary spanners<br><br>Environmental context:<br>- External support availability |

| Author(s), Year & Country | Technology | Variable | Method | Additional Theory | Findings |
|---|---|---|---|---|---|
| | | | development<br>- Information and technology<br>- Chemicals<br>- Education | | |

# Appendix 3 Invitation to Participate in A Research Project and Participant's Consent Form

13 February 2012

**INVITATION TO PARTICIPATE IN A RESEARCH PROJECT**

**PARTICIPANT INFORMATION**

**Project Title:**
Adoption and Use of Generalized Audit Software (GAS) by Indonesian Audit Firms

**Investigator:**
Rindang Widuri
PhD Student
School of Accounting
RMIT University

Tel. +61 3 9925 5687

**Supervisors:**

Prof. Brendan O'Connell
Senior Supervisor
School of Accounting
RMIT University
brendan.oconnell@rmit.edu.au
+61 3 9925 5771

Assoc. Prof. Prem Yapa
Second Supervisor
School of Accounting
RMIT University
prem.yapa@rmit.edu.au
+61 3 9925 1606

Dear participant,

You are invited to participate in a research project being conducted by RMIT University. Please read this sheet carefully and be confident that you understand its contents before deciding whether to participate. If you have any questions about the project, please ask one of the investigators.

**Who is involved in this research project? Why is it being conducted?**

The principal investigator in this research project is me, Rindang Widuri, a PhD student at the School of Accounting, RMIT University. My senior supervisor is Prof. Brendan O'Connell and my second supervisor is Assoc. Prof. Prem Yapa. This research is conducted as part of PhD degree at the School of Accounting, RMIT University, Australia. This project has been approved by the RMIT Human Research Ethics Committee,

**Why have you been approached?**

You have been approached for this research project because you are an external auditor who is currently doing an audit engagement in Indonesia. Your contact details have been obtained from Accounting Firm Directory that is provided and published by IICPA.

**What is the project about? What are the questions being addressed?**

The project aims are to examine external auditors' acceptance and usage of generalised audit software (GAS) and to develop a model of technology acceptance of GAS by Indonesian external auditors based on existing technology acceptance models.

To achieve the project aims, the key research questions being addressed are (1) what GAS is being used by external auditors in Indonesia in practice and what is the context of its usage? (2) what are the barriers, if any,

to greater usage of GAS in Indonesia? (3) how do Indonesian external auditors perceive that GAS usage contributes to the quality of audit?

This project is expected to gather data from 22 external auditors, 1 senior member of IICPA, 1 senior member of IIA and 1 accounting academic from University.

**If I agree to participate, what will be required to do?**

The investigator will ask you questions regarding your knowledge in GAS implementation in your accounting firms. You will also be asked regarding the following questions: your experience using GAS in audit engagements. What are the significant determinants for auditor to accept and use GAS? How do you perceive that GAS usage contributes to the quality of audit? If you have not implemented GAS, you will be asked regarding what factors that hinders the implementation of GAS.

The interview will take 50 – 60 minutes and it will be audio recorded, however, if you do not wish to be audio recorded, no recording will be presented. If during the interview, you feel any unpleasant or inconvenient events resulting from the questions or the interviewer's behaviour, you may opt to withdraw your participation, without any consequences whatsoever.

After your interview data have been fully transcribed, we will send it to you to confirm whether or not we correctly transcribe your answers during the interview. If you have any objections to the transcription and you would like to amend your answers, you are free to do so. You could also examine the whole set of interview questions before the interview begin, in order to decide your participation.

**What are the possible risks or disadvantages?**

There are no perceived risks for your normal day-to-day activities resulting from your participation in this research project. If you are unduly concerned about your responses to any of interview questions or if you find participation in the project distressing, kindly contact me, Rindang Widuri or my supervisors listed above, at your earliest convenience. I or my supervisors will discuss your concerns with you confidentially and suggest appropriate follow up, if necessary. If any serious risks collected from the interview data are revealed by this research project, and the risks is in your interest to know, I will contact you as soon as possible.

**What are the benefits associated with participation?**

This research project is funded by AusAid. There is no direct benefit to you as a participant; however I will be pleased to provide you with a copy of the report of this research project when it is published.

**What will happen to the information I provide?**

The information you provide will be important to this research project. Your participation in this research is anonymous, meaning you cannot be identified at any stage of the research project. Your participation is also confidential, any details about you will only be seen by me and my supervisors listed above. Your data will be safely stored in a locked drawer in my office at RMIT University.

All information such as phone numbers and e-mail addresses and all data collected during the interview, will be kept confidential and can only be accessed by me and my supervisors. You can review the audio recording and / or minutes of interview to edit or delete your contribution. After data analysis is complete, the information gathered during the interviews will be removed or replaced with a code that does not identify the participants. Non-identifiable data will be stored safely for 5 years at the School of Accounting, RMIT University, Melbourne, Australia. At the end of this project, a summary of research results and related reports will be available upon your request (only a summary of your interview). The final results will be reported in the thesis to obtain a doctoral degree, in a paper presented at the conference and publication in scientific journals.

Any information that you provide can be disclosed only if (1) it is to protect you or others from harm, (2) a court order is produced, or (3) you provide the researchers with written permission.

The results from this research project will be disseminated in the form of conference papers and/or journal papers. When disclosed, the data will be aggregated. The research data will be kept securely for a period of 5 years after publication, before being destroyed.

**What are my rights as a participant?**

Kindly find the Participant Consent Form at the end of this information sheet, which you need to sign before I can begin the interview. Participation in this research is entirely voluntary and anonymous. You have the right to withdraw from participation at any time and you have the right to have any unprocessed data withdrawn and destroyed, provided it can be reliably identified, and provided that so doing does not increase your risk as a participant. You also have the right to request that audio recordings be terminated during the interview and you have the right to have any questions answered at any time.

**Whom should I contact if I have any questions?**

If you should have any queries regarding this research project, please do not hesitate to contact me as the principal investigator or my supervisors at contact details listed above.

**What other issues should I be aware of before deciding whether to participate?**

If you think your involvement in this research project may raise any ethical issues due to your position as an auditor, you may withdraw your participation immediately and there will be no consequences whatsoever for your withdrawal.

Yours sincerely,

Rindang Widuri
PhD Student
School of Accounting
Building 108, Level 15, 239 Bourke Street, Melbourne, VIC 3000
Australia

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**PARTICIPANT'S CONSENT**

1. I have had the project explained to me, and I have read the information sheet.
2. I agree to participate in the research project as described.

   I agree to be interviewed

   I agree to have my voice audio recorded
3. I acknowledge that:
   a. I understand that my participation is voluntary and that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied (unless follow up is needed for safety).
   b. The project is for the purpose of research. It may not be of direct benefit to me.
   c. The privacy of the personal information I provide will be save guarded and only be disclosed where I

have consented to the disclosure or as required by law.

d. The security of the research data will be protected during and after completion of the study. The data collected during the study may be published, and a report of the project outcomes will be provided to me at the end of the research project upon my request. Any information which will identify me will not be used.

**Participant's Consent**

Participant: _____ Date : _____

*(Signature)*

If you have any complaints about your participation in this project please see the complaints procedure on the Complaints with respect to participation in research at RMIT page

Participants should be given a photocopy of this PICF after it has been signed

## Appendix 4 Adoption Factors Classified by Audit Firm Size

| Category | Adoption Factors | The Big 4 | Mid-tiered | Small-sized |
|---|---|---|---|---|
| Technology | Compatibility with the audit firm's existing IT platform | ● | ● | △ |
| | Compatibility with the client's existing IT platform | ◆ | ◆ | ◆ |
| | Fitness to task | ◆ | ◆ | ◆ |
| | GAS complexity | ● | ● | △ |
| | Language compatibility | ● | △ | ◆ |
| Organization | Audit approach/methodology | ◆ | △ | |
| | Audit firm size | △ | ◆ | ◆ |
| | Auditor's attitudes | ◆ | ◆ | ◆ |
| | 'Champion' / auditor's experience with CAATs/GAS | ◆ | △ | ◆ |
| | Firm policy and support | ◆ | ◆ | ◆ |
| | IT capital budgets | ◆ | ◆ | ◆ |
| | IT skills of auditors | ◆ | ◆ | ◆ |
| | IT support staff | ◆ | ◆ | △ |
| | Learning costs | ◆ | ◆ | ◆ |
| Environment | Audit standards requiremements or expectations | ◆ | ◆ | ● |
| | Availability of IT skilled auditors in the Indonesian labour market | ◆ | ◆ | △ |
| | Clients' needs and expectations | ◆ | ◆ | ◆ |
| | Clients' size and industry | ◆ | ◆ | ◆ |
| | Foreign investment expectations within the country | ● | | ● |
| | Vendor of audit software | △ | ◆ | ● |
| | Regulators and/or professional body level of support and requirements | ◆ | ◆ | ◆ |

✧: Highly influential factor (rated by more than fifty per cent of a group of participants)

△: Somewhat influential factor (rated by more than thirty per cent to forty-nine per cent of a group of participants)

○: Less influential factor (rated by 0 per cent to twenty-nine of a group of participants)